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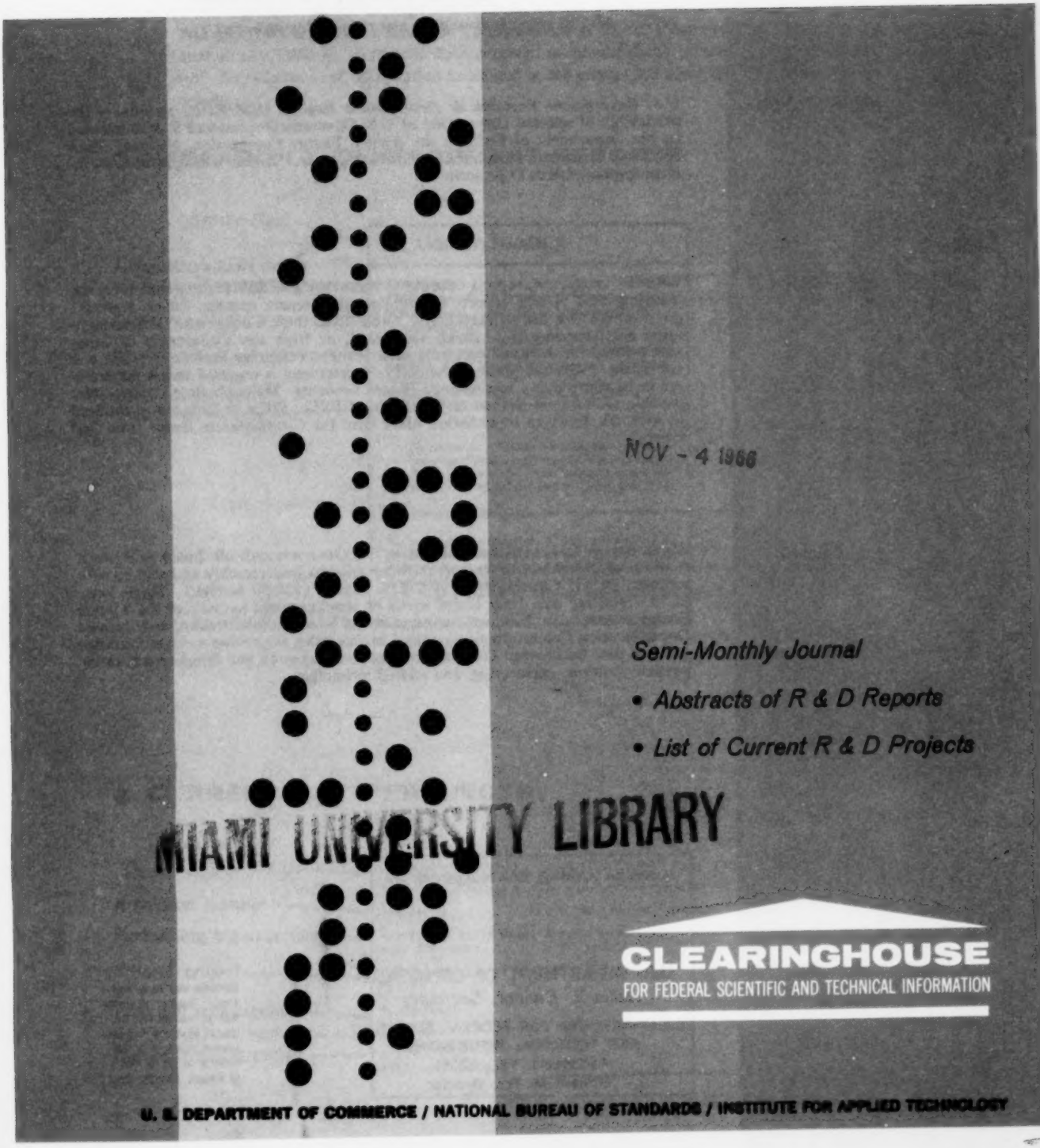
September 10, 1966

U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS



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Semi-Monthly Journal

- *Abstracts of R & D Reports*
- *List of Current R & D Projects*

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U. S. DEPARTMENT OF COMMERCE / NATIONAL BUREAU OF STANDARDS / INSTITUTE FOR APPLIED TECHNOLOGY

September 10, 1966 / Volume 41, Number 17

U.S. Government

RESEARCH AND DEVELOPMENT REPORTS

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PURPOSE

U.S. Government Research & Development Reports (USGRDR) announces the availability of selected new reports of U.S. Government-sponsored R & D released by the Department of Defense, the Atomic Energy Commission, National Aeronautics & Space Administration, and other agencies. It also lists current Government-sponsored R & D projects.

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INDEX

All entries in USGRDR are indexed in the *Government-Wide Index to Federal Research & Development Reports (GWI)* published semi-monthly and sold on subscription by the Clearinghouse at $22.00 a year ($27.50 foreign). Single copy $1.75. Indexing data from recent issues of announcement journals of the Atomic Energy Commission, National Aeronautics and Space Administration, and Defense Documentation Center are also included in this index to provide a single reference guide to new unclassified Government-sponsored research and development in the physical sciences, engineering, and related technology.

U.S. DEPARTMENT OF COMMERCE
John T. Connor, Secretary

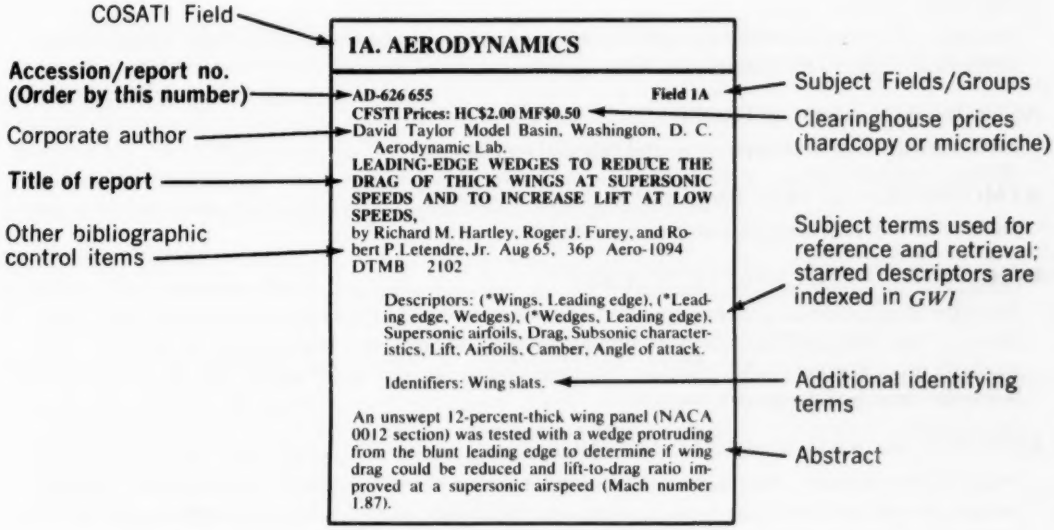
CLEARINGHOUSE FOR FEDERAL SCIENTIFIC
AND TECHNICAL INFORMATION
Springfield, Va. 22151
Bernard M. Fry, Director

Contents may be printed freely. Mention of source will be appreciated.
Use of funds for this publication approved by the Director of the Bureau of Budget, June 22, 1966.

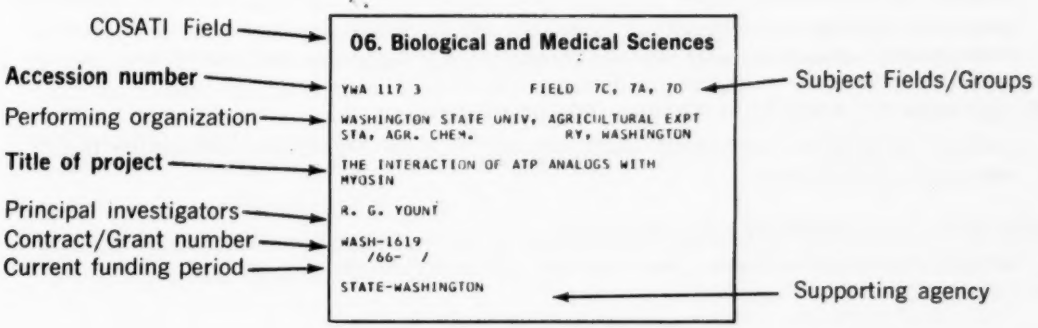
USGRDR FORMAT

Entries are arranged under 22 subject categories called FIELDS. In the entry, subcategories called GROUPS and occasionally sub-groupings are also indicated. This system was adopted by the Committee on Scientific and Technical Information (COSATI) of the Federal Council on Science and Technology. The COSATI Subject Category List, AD 612 200, is available from the Clearinghouse at $1.00. Documents are listed alphanumerically (that is, alphabetic data precedes numerical data) by accession/report number. Key segments of information contained in the entries are identified diagrammatically below.

● RESEARCH & DEVELOPMENT REPORTS


COSATI Field
1A. AERODYNAMICS
Accession/report no. (Order by this number)
AD-626 655
Field 1A
Subject Fields/Groups
CFSTI Prices: HC$2.00 MF$0.50
Clearinghouse prices (hardcopy or microfiche)
Corporate author
David Taylor Model Basin, Washington, D. C. Aerodynamic Lab.
Title of report
LEADING-EDGE WEDGES TO REDUCE THE DRAG OF THICK WINGS AT SUPERSONIC SPEEDS AND TO INCREASE LIFT AT LOW SPEEDS,
Other bibliographic control items
by Richard M. Hartley, Roger J. Furey, and Robert P.Letendre, Jr. Aug 65, 36p Aero-1094 DTMB 2102
Subject terms used for reference and retrieval; starred descriptors are indexed in GWI
Descriptors: (*Wings, Leading edge), (*Leading edge, Wedges), (*Wedges, Leading edge), Supersonic airfoils, Drag, Subsonic characteristics, Lift, Airfoils, Camber, Angle of attack.
Identifiers: Wing slats.
Additional identifying terms
An unswept 12-percent-thick wing panel (NACA 0012 section) was tested with a wedge protruding from the blunt leading edge to determine if wing drag could be reduced and lift-to-drag ratio improved at a supersonic airspeed (Mach number 1.87).
Abstract

● CURRENT R & D PROJECTS



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01 AERONAUTICS 1

Includes aerodynamics; aeronautics; aircraft; aircraft flight control and instrumentation; and air facilities.

02 AGRICULTURE 5

Includes agricultural chemistry; agricultural economics; agricultural engineering; agronomy and horticulture; animal husbandry; and forestry.

03 ASTRONOMY AND ASTROPHYSICS 6

Includes astronomy; astrophysics; and celestial mechanics.

04 ATMOSPHERIC SCIENCES 7

Includes atmospheric physics and meteorology.

05 BEHAVIORAL AND SOCIAL SCIENCES 14

Includes administration and management; documentation and information technology; economics; history, law and political science; human factors engineering; humanities; linguistics; man-machine relations; personnel selection, training, and evaluation; psychology (individual and group behavior); and sociology.

06 BIOLOGICAL AND MEDICAL SCIENCES 26

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07 CHEMISTRY 41

Includes chemical engineering; inorganic chemistry; organic chemistry; physical chemistry; and radio and radiation chemistry.

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09 ELECTRONICS AND ELECTRICAL ENGINEERING 52

Includes components; computers; electronic and electrical engineering; information theory; subsystems; and telemetry.

10 ENERGY CONVERSION (Non-Propulsive) 61

Includes conversion techniques; power sources; and energy storage.

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11	MATERIALS Includes adhesives and seals; ceramics, refractories, and glasses; coatings, colorants, and finishes; composite materials; fibers and textiles; metallurgy and metallography; miscellaneous materials; oils, lubricants, and hydraulic fluids; plastics; rubbers; solvents, cleaners, and abrasives; and wood and paper products.	64
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RESEARCH highlights

Reports of current high industrial interest

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Engineering and Construction

ARMY ENGINEERS DESCRIBE PAVEMENT DESIGN CRITERIA FOR AIRFIELDS

(Order Stock No. AD-634 614 Basis for Rigid Pavement Design for Military Airfields, HC $3.00/MF 75 cents.)

The Army's Corps of Engineers has published a paper that describes the various factors which influence the current rigid pavement design criteria for military airfields. Charged with the responsibility for their design and construction since 1940, the Army notes that until 1955 emphasis was to maintain the criteria current with developments of aircraft and improvements in technology. By 1955 the pavement criteria for the then heaviest aircraft (B-52) had been conducted and it was felt that the criteria would be adequate for aircraft loadings in the foreseeable future. The investigation program was then reoriented to place more emphasis on studies of materials and procedures for maintaining the existing pavements. Since 1956 the major emphasis has been on the development of better joint sealing materials and the improvement of methods for bonding concrete to concrete for repair and strengthening purposes. The Army's report gives a list of references which are a relatively comprehensive history of the development of the criteria now used.

SOIL STRAIN GAGES IMPROVED

(Order Stock No. AD-633 887 Soil Strain Gage Instrumentation, HC $3.00/ MF 75 cents.)

Improved soil strain gage hardware developed by IIT Research Institute can be used in the field with large size sensors and lead wire lengths from a few feet to 1000 feet to measure static and dynamic strains. Increased gage sensitivity, greater permissible gage length and corresponding increases in alignment tolerances, and ease of selecting matched coil pairs make the field gage instrument also desirable for laboratory use. Gage coil size may be selected to most readily adapt to a specific application. Phase and amplitude balance controls permit a precise null balance to be obtained, compensating for electrical differences in gage coils. Gage lengths of up to three coil diameters may be used while maintaining sufficient sensitivity to cause full scale output for a one percent change in gage length. The instrumentation provides for the use of several gages with an external oscillator to permit the use of up to eight gages in near proximity without mutual beat frequency interference. The gage system has a response rise time of 0.3 msec from 10 percent to 90 percent full-scale output. In laboratory applications, where long lead wires are not required, minor modifications to the circuitry would permit gage response time to be reduced from 0.3 msec by a factor of three or more. Use of the gage in the laboratory, however, does necessitate evaluation to be made of possible effects of the test chamber on gage response.

SHOTCRETE PROPERTIES REVIEWED BY NAVAL ENGINEERS

(Order Stock No. AD-634 074 Engineering Properties of Shotcrete, HC $3.00/MF 50 cents.)

The Naval Civil Engineering Laboratory has completed a study of 55 years of laboratory and field experiences with shotcrete mortar and concrete applied pneumatically. Mortar or concrete is conveyed through a hose and discharged through a nozzle, usually hand-held, at high velocity onto a suitably prepared inflexible surface. The product, which has been premixed either dry (water added at the nozzle) or wet (water added prior to entry into the hose), is sufficiently stiff at impaction to support itself without sagging from an overhead surface or sloughing from a vertical surface. In addition to general facts concerning this method of construction, the Navy's study discusses various physical properties of hardened shotcrete. Among the important properties are unit weight (bulk density), voids, strength (bond, compressive, flexural, shear, tensile), Young's modulus, shrinkage and swellage, creep, contraction and expansion, moisture absorption, permeability, and durability (resistance to abrasion, fire, and alternate freezing and thawing). The report recommends an experimental program for (1) developing supplementary data with regard to density, elasticity, and strength of premixed wet hardened shotcretes made with 3/4-inch and 3/8-inch maximum-size aggregate, and (2) ascertaining whether comparatively small prismatic test specimens represent the engineering properties of hardened shotcrete in large wall panels. The results of any forthcoming study will be reported.

EXPLOSIVES WITH HAMMERHEADS DRIVE PILES

(Order Stock No. AD-634 738 Optimization Study of an Explosive-Driven Pile, HC $2.00/MF 50 cents.)

Explosives on top of piles can be used to drive 6-in. and 8-in. diameter heavy-walled steel piles into ordinary ground and even permafrost with acceptable damage, according to the report of a test program performed by Explosiform Inc. for the Army's Cold Regions Research and Engineering Laboratory. The report suggests the use of low detonation pressure explosives such as Nitroguanidine, using a dished hammerhead technique. In one experiment a hammerhead was used to drive a 60-inch long, 2-inch OD, 3/16-inch wall, 5050E fluid line tubing pile by the detonation of 3.25 pounds of Nitroguanidine on its concave surface. The pile was driven to 75 inches -- completely below the surface -- in one shot. Damage to the pile and hammerhead was negligible. The report describes the test program, gives illustrations, and a series of tables.

Management Control, Decision Systems

PROFILES OFFER PRODUCTION GUIDELINES

Industry Profiles, a series of publications prepared for the Clearinghouse as an agent for the Agency for International Development, offer valuable production and market information to those who are considering the establishment of a new business or plant in the United States or abroad. The Clearinghouse now has 233 individual titles in the series, each of which gives basic information on a small or medium-sized plant in a specific industry which businessmen, industries contemplating diversification, and lending institutions can use as valuable guidelines. Potential investors can examine the profiles for the industries in which they are interested, and take the initial step in the process of deciding whether to embark on particular projects.

Prepared by Surveys and Research Inc., Washington, D. C., the Profiles briefly give a product description, a general evaluation of strengths and weaknesses of the product field, market aspects, and capital requirements. Each gives annual cost figures of materials and supplies needed, power, fuel and water, transportation, and manpower. A plant lay-out is provided, plus reference material on technical journals, patents, and other pertinent information.

A free list of the 233 titles now completed is available. Individual copies of the Profiles are $1.00. A subscription service through which all Industry Profiles may be received as they are produced (about 250 in 1966) is available for $200. All orders must be prepaid or a Clearinghouse Deposit Account may be used. Order from Clearinghouse, U. S. Department of Commerce, Springfield, Va. 22151, or from Department of Commerce Field Offices.

LOCAL MANPOWER FORECASTING CENTERS RECOMMENDED

(Order Stock No. PB-170 599-1 The Role of the Federal Government in Technological Forecasting (Summary and Recommendations), HC $1.00/MF 50 cents; and

PB-170 599-2 The Role of the Federal Government in Technological Forecasting (Full Report), HC $6.00/MF $1.50.)

The report of a special interagency task group probing the role of the Federal Government in technological forecasting recommends that local manpower forecasting centers be established on a nationwide basis. Its report to the President's Committee on Manpower and to the National Commission on Technology, Automation and Economic Progress indicates that forecasting technological change in itself is not practiced much and is of little interest to potential users either inside or outside of the Federal Government.

What is principally of interest is the local forecasting of factors such as occupational demand, and employment or industrial growth. Technological change is only one component and frequently a minor component.

A major conclusion of the group's report is the need for a full-scale analysis of the nation's manpower system which would be a basis for exploring, before the fact, the alternative Federal policies related to manpower. Furthermore, in supporting local manpower adjustment activities, the group recommends that the nation's current sources of short-term forecasts of occupational demand and manpower availability should be assembled in each municipality in a local information center so as to form a single coherent picture of short-term demand, as compared with future manpower availability for each community.

The manpower forecasts should take note of perceived skills and occupational training requirements and be regularly updated and well advertised. In addition, the forecasts should be made readily available to local guidance counselors and vocational trainers, public and private employment service people, and other manpower adjustment mediators. Input sources should include employers, civic groups, banks, educational and research institutions, and information from publications of local U. S. Employment Offices, such as area skill surveys and training need surveys. The task group further recommends that the information centers couple their operations with local businesses and labor unions and rely on these organizations for advice, information, and possible financial support.

TOWARD A MORE EFFECTIVE CHANNELING OF NEW TECHNOLOGY

(Order Stock No. N66-19042 Background, Guidelines, and Recommendations for Use in Assessing Effective Means of Channeling New Technologies in Promising Directions, HC $7.00/MF $1.75.)

More effective transfer and utilization of new technology should be made a national goal established at the highest levels, according to an advisory study made for the National Commission on Technology, Automation, and Economic

Progress. Authors of the report, Dr. Richard L. Lesher, the Space Agency's Deputy Assistant Administrator for Technology Utilization, and George J. Howick of Midwest Research Institute, indicate there is widespread agreement among those who have studied the issue that the knowledge resulting from public investment in R and D constitutes a major, rapidly increasing, and insufficiently exploited national resource.

The report to the National Commission on Technology points out that the $15-1/2 billion in Federal funds supporting research and development programs this year will generate more knowledge than we generated in a full decade less than half a life span ago. But it also points out that new technology has no value until it is used. It cannot be adapted for use by an organization unaware of its existence.

"The effective use of this resource can increase the rate of economic growth, create new employment opportunities, and help to offset imbalances between regions and between industries," the report adds. "It can aid the international competitive position of U. S. industry, enhance our national prestige, improve the quality of life, and assist significantly in filling unmet human and community needs."

The report notes that a considerable portion of the technology resulting from our military, space, and nuclear work is relevant to needs outside those mission areas. However, devising means of channeling new technologies in promising directions and bringing about the use of new technology for significant purposes other than the immediate use for which it was developed, "have become activities ranking among the most intellectually challenging undertakings of our time."

What are some of the barriers to acceptance of innovation that have been compiled by those who either practice technology transfer or have studied the transfer process? In a study made for the Space Agency, the Denver Research Institute lists barriers or obstacles in private companies as uncertainty and risk, reluctance to change, lack of knowledge, Government regulations, capital requirements, proprietary data, security regulations, organizational rigidities, and incompatibilities between Government and commercial R and D and production.

Dr. Charles Kimball, President of the Midwest Research Institute, puts it succinctly: "The real barriers are neither financial nor technical. The barriers are outdated institutional practice, lack of entrepreneurship, and reluctance to accept new ideas and new practices."

But there are valuable incentives or stimuli to the acceptance of innovation by technology transfer. They are such things as profit motive, diversification, competition, continuity of the firm, market preemption, and management sophistication.

"It is recommended," says the report to the National Commission of Technology, "that all those involved in programs to channel new technologies in promising directions spend some time on the marketing aspects of the business, communicating to prospective users the vast potential value of the knowledge resource and reacting to the needs of special groups of users by tailoring programs to fit their requirements."

Metals, Non-Ferrous and Alloys

BATTELLE SURVEYS SURFACE TREATMENTS FOR NICKEL

(Order Stock No. AD-634 076 Surface Treatments for Nickel and Nickel-Base Alloys, HC $4.00/MF $1.00.)

A report on surface treatments for nickel and nickel-base alloys prepared by Battelle Memorial Institute for the Redstone Arsenal Information Center and the Space Agency is one of a state-of-the-art series in the general field of materials fabrication. Battelle notes that treatments have been developed that can improve a number of characteristics of the surfaces of articles made from nickel and nickel-base alloys. Improvements can be made in lubricity, resistance to corrosive attack by oxidizing and/or sulfur-containing atmospheres, and resistance to wear, erosion, and fatigue. The surface treatments may be grouped into two categories -- coating treatments and mechanical treatments. The Battelle report covers diffusion coating, electroplating, electroless plating, hard facing, coating for lubrication, burnishing, explosive hardening, peening and planishing. Other surface treatments such as grinding, machining, and vacuum metallizing are not included but are covered in other reports which the Clearinghouse will announce as they become available. For each surface treatment considered, details of the procedures used to accomplish the treatment on nickel and nickel-base alloys are given whenever available. Data showing the effect of surface treatments on the material properties are also presented when available and appropriate. To ensure that the property data presented are up to date and to obtain information on current shop practices, Battelle made personal contacts with 40 individuals from 35 organizations.

TITANIUM HEAT TREATMENT STATE-OF-THE-ART

(Order Stock No. AD-635 083 Heat Treatment of Titanium and Titanium Alloys, HC $3.00/MF 75 cents.)

A Battelle state-of-the-art report on heat treatment of titanium alloys is a companion to the preceding publication. It is intended to provide information useful to designers, fabricators, and users of titanium materials. The detailed discussions involving the metallurgical background, methods, techniques, equipment, and precautions are considered by Battelle to be reliable guides underlying current practice employed in the thermal treatments of titanium and titanium alloys. The metallurgical background illustrating the principles used in titanium heat treatment is discussed with respect to alloy classifications, structures, and hardening mechanisms. The report summarizes information collected from books, technical conferences, reports on Government contracts, and interviews with technical personnel actively engaged in titanium heat treatment. It cites 27 references, most of which are for 1965.

ADVANCES IN HIGH-TEMPERATURE MATERIALS LISTED

(Order Stock No. GEMP-400A Fifth Annual Report -- High-Temperature Materials Programs (Part A), HC $6.00/MF $1.50.)

The fifth annual report on high-temperature materials programs conducted by General Electric's Atomic Products Division concerns R and D progress through January 1966 on a variety of refractory metals and alloys, much of it related to reactor materials research and fuel systems. The volume covers 13 unclassified programs: (1) properties of refractory materials in the 1000° to 3000°C temperature range; (2) radiation effects on the time-, temperature-, and stress-dependent properties of refractory metals; (3) the fission products transport processes in refractory-metal fuel systems at temperatures exceeding 1700°C; (4) development of new refractory-metal alloys; (5) development of oxidation- and corrosion-resistant fuel element materials; (6) the mechanism and thermodynamics governing phase stability and reactions between Fe-Cr-Al alloys and UO_2; (7) radiation effects on the time-, temperature-, and stress-dependent properties of heat resistant alloys; (8) low cycle fatigue of heat resistant alloys; (9) the behavior of Zr-alloy- and stainless steel-clad UO_2 in steam and air to the melting point of UO_2; (10) radiation effects in BeO in terms of composition and microstructure; (11) high-temperature thermocouple, electrical, and electronic materials; (12) the use of a fertile material (thoria) in stabilized-fuel BeO systems; and (13) fission gas diffusion in unfueled ceramics.

Nuclear Technology

PLUTONIUM'S CIVILIAN POTENTIAL EMPHASIZED

(Order Stock No. CONF-660308 Commercial Plutonium Fuels Conference, HC $3.00/MF $1.50.)

The Proceedings of the Commercial Plutonium Fuels Conference held in Washington, D. C., March 1-2, 1966, have been published by the Atomic Energy Commission. Sponsored by the Atomic Industrial Forum, the Edison Electric Institute, and the American Nuclear Society in cooperation with the AEC, the conference received papers relating to plutonium fuels and requirements, plutonium availability and industry processing capability, technical aspects of plutonium processing, and plutonium as a reactor fuel. The conference theme was the civilian potential of an element which has been primarily of military value for 25 years and at the time of its discovery was not even visible. The element has grown, however, from infinitesimal amount in 1941 to a point where today it is measured in 1000's and tens of 1000's of kilograms. According to Dr. Glenn T. Seaborg, Chairman, U. S. Atomic Energy Commission and co-discoverer of plutonium, "It is obvious that the past 25 years will prove to be only a prelude to the full plutonium story. . . While the growth of plutonium in sheer amounts of material has been tremendous, it is obvious that its future growth in application and quantity will far surpass these past achievements. This anticipated growth has economic implications of great importance which, of course, form the basis for the interest in the present meeting."

NUCLEAR ELECTRICITY COSTS CALCULATED BY COMPUTER

(Order Stock No. ORNL-3944 A Procedure and a Computer Code POWERCO for Calculating the Cost of Electricity Produced by Nuclear Power Stations, HC $3.00/MF 75 cents.)

The cost of electricity produced by nuclear power stations can be calculated by a procedure and a computer code (POWERCO) devised by Oak Ridge National Laboratory. The procedure assumes that all the cash expenses of the project are known, both in amount and timing. Although the nomenclature of POWERCO is built around that of a nuclear power plant project, the economic problem being solved is quite general and it can be used to calculate costs in other fields. The cost calculation is based on the fundamental economic requirement that the incomes received must provide for the recovery of investment, return on investment, and all operating expenses. The method used does not depend on the fixed-charge-rate concept, nor on the fuel-working capital and carrying-charge concepts. Although widely used in the power industry, this method is not well adapted to engineering economic studies, says Oak Ridge, because of a lack of clarity regarding the way in which fixed charge rates, interest rates, and working capital are determined. Since this lack of clarity has arisen because of a failure to establish a clear relationship between the charge-rate method and the more fundamental payout-of-investment method, Oak Ridge has developed equations that clarify this relationship. This makes it possible to calculate true fixed charge rates and true average fuel working capital. The output of the code displays these quantities. The output also includes a tabulation showing the payout of the investment, that is, the gradual decline of the outstanding investment in bonds and equity over the life of the project.

U. S. NUCLEAR STANDARDS REVISED

(Order Stock No. ORNL-NSIC-11 1965 Compilation of United States Nuclear Standards, 2nd Edition, 1965, HC $4.00/MF 75 cents.)

The Compilation of United States Nuclear Standards has been revised by American Standards Association for the Atomic Energy Commission. All known U. S. nuclear standards activities and regulations are presented in the publication in tabular form. The standards activities of all organizations including technical societies, as well as relevant regulations established by Government agencies, are listed. In the U. S. the most concerted standards effort is channeled through the ASA, the national federation of more than 110 technical societies and trade associations, plus 2300 company members. Thus, the nuclear standards effort of most organizations, including many of those listed in this publication who also conduct some independent activities, are represented in the standards program of the ASA. The publication contains an appendix that is a special report on the transportation of radioactive materials. According to the ASA, it is most useful in defining the contents and scope of existing regulations for the transportation of various forms of radioactive substances.

RESEARCH & DEVELOPMENT REPORTS

1A. AERODYNAMICS

AD-635 954 **Field 1A, 1B**
CFSTI Prices: HC$4.00 MF$0.75
Norair Div., Northrop Corp., Hawthorne, Calif.
T-38 DYNAMIC RESPONSE GUST LOADS COMPARISON BETWEEN FLIGHT TEST AND ANALYTICAL RESULTS.
by A. K. Cross. Mar 64, 102p NOR-60-306
Contract AF 33 (600)-33168

Descriptors: (*Training planes, Performance (Engineering)), Flight testing, Sonic fatigue, Gust loads, Fatigue (Mechanics), Analysis.

Identifiers: T-38 aircraft.

The fatigue certification program for the T-38 airplane is a comprehensive program aimed at evaluating the service life of the airplane. The program consists of four principle phases. Formal program reports that are associated with each of the four phases are also included. The reports contain a detail description of the test program, test results and comparisons between test and analytical results. The four phases are: analytical determination of spectrum data and fatique life, small specimen and full scale fatigue test program, dynamic response and sonic environment flight test program, small specimen and full scale sonic fatigue test program. (Author)

N66-14626 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
TEST OF A NASA BLUNT BODY WITH FLARES IN THE JPL 20-INCH SUPERSONIC AND 21-INCH HYPERSONIC WIND TUNNELS.
by R. W. Weaver. 17 Feb 63, 30p WT-21-115
Contract NAS7-100
NASA-CR-69129

Descriptors: *Flare, *Aerodynamic characteristics, *Blunt body, *Hypersonic speed, *Supersonic speed.

For abstract, see T 66 17.

N66-14869 **Field 1A**
CFSTI Prices: HC$1.00 MF$0.50
University Coll., Nairobi (Kenya). Dept. of Mechanical Engineering.
AN EXPLICIT THEORETICAL RELATION FOR SKIN FRICTION MEASURED WITH PRESTON OR STANTON TUBE IN TURBULENT FLOW.
by R. P. Patel. Jun 65, 14p M-65-1

Descriptors: *Friction measurement, *Turbulent flow, *Preston tube, *Reynolds number, *Skin friction.

N66-15062 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
Aeronautical Research Council, London (England).
AN EXPERIMENTAL INVESTIGATION INTO THE DETERMINATION OF LIFT FROM WAKE TRAVERSES AT SUPERSONIC SPEEDS.
by M. C. P. Firmin, and J. Wooller. 1965, 29p
ARC-CP-801, ARC-26551

Descriptors: *Supersonic flow, *Wake, *Approximation method, *Lift.

N66-15120 **Field 1A, 20M**
CFSTI Prices: HC$2.00 MF$0.50
Saab Aircraft Co., Linkoping (Sweden).
CALCULATION OF TEMPERATURE IN AN INFINITE WEDGE WITH GIVEN HEAT FLUX THROUGH ITS BOUNDING SURFACES.
by B. Arlinger. Aug 65, 35p SAAB-TN-59

Descriptors: *Surface, *Temperature distribution, *Green function, *Heat flow, *Wedge.

N66-15306 **Field 1A**
CFSTI Prices: HC$4.00 MF$0.75
Wichita Univ., Kans. Dept. of Aeronautical Engineering.
A REVIEW OF THE PLANFORM EFFECTS ON THE LOW-SPEED AERODYNAMIC CHARACTERISTICS OF TRIANGULAR AND MODIFIED TRIANGULAR WINGS.
Final rept.
by K. Razak, and M. H. Snyder Jr. Sep 65, 109p AR-65-3
Grant NGR-17-03-002
NASA-CR-69247

Descriptors: *Aerodynamics, *Delta wing, *Flow characteristics, *Lifting surface, *Sharp leading edge.

N66-15389 **Field 1A**
CFSTI Prices: HC$4.00 MF$1.00
LTV Astronautics Div., Ling-Temco-Vought, Inc., Dallas, Tex.
AN INVESTIGATION OF THE AERODYNAMIC CHARACTERISTICS OF A 25 DEG SPHERE-CONE INCLUDING A PRESSURE DISTRIBUTION ANALYSIS AT ANGLES OF ATTACK, AND A TRAJECTORY ANALYSIS DURING A TYPICAL REENTRY TRAJECTORY.
by J. W. Arnold, W. T. Miller, and H. L. Simmons. 1965, 140p
Contract NAS1-3915
NASA-CR-66037

Descriptors: *Pressure distribution, *Reentry body, *Aerodynamic characteristics, *Angle of attack, *Trajectory analysis.

N66-15445 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
Rice Univ., Houston, Tex. Dept. of Mechanical and Aerospace Engineering and Materials Science.
MAXIMUM LIFT-TO-DRAG RATIOS OF A SLENDER, FLAT-TOP, HYPERSONIC BODIES. PART 1.
by D. G. Hull, and A. Miele. 1965, 32p AAR-10
Grant NGR-44-006-034
NASA-CR-69383

Descriptors: *Hypersonic speed, *Lift-drag ratio, *Slender body.

N66-15612 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
Alabama Univ. Research Inst., Huntsville.
HYPERSONIC AERODYNAMIC PROBLEMS AT RE-ENTRY OF SPACE VEHICLES.
by R. Hermann. Nov 65, 32p UARI-29
Grant NsG-381
NASA-CR-69486
Presented at theSpace Symp. (4th), Gottingen Univ., West Germany, Oct 18-22, 1965.

Descriptors: *Atmospheric entry, *Blackout, *Hypersonic flow, *Plasma physics, *Reentry physics.

N66-15629 **Field 1A**
CFSTI Prices: HC$3.00 MF$0.75
National Aero- and Astronautical Research Inst., Amsterdam (Netherlands).
A WINDTUNNEL INVESTIGATION OF THE BUFFET LOADS AND BUFFET PRESSURES ON THE ELDO SATELLITE LAUNCHING VEHICLE.
by J. W. G. Van Nunen. 29 Jul 65, 81p F-244, FF-15

Descriptors: *Transonic wind tunnel, *Buffeting, *Eldo Launch vehicle, *Spacecraft model.

N66-15793 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
EFFECTS OF A MAGNETIC FIELD ON THE CONDUCTION HEAT TRANSFER AT THE STAGNATION POINT OF A PARTIALLY IONIZED ARGON GAS.
by J. F. Schmidt. Feb 66, 29p NASA-TN-D-3251

Descriptors: *Argon plasma, *Stagnation point, *Heat transfer, *Ionized gas, *Magnetic field.

N66-15867 **Field 1A**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Langley Station, Va. Manned Spacecraft Center.
A PROGRAM FOR EQUILIBRIUM NORMAL SHOCK AND STAGNATION POINT SOLUTIONS FOR ARBITRARY GAS MIXTURES.
by L. B. Callis, and J. T. Kemper. Feb 66, 80p
NASA-TN-D-3215

Descriptors: *Stagnation point, *Computer program, *Equilibrium flow, *Fortran, *Gas mixture.

N66-16057 **Field 1A**
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
AERODYNAMIC CHARACTERISTICS OF THE SHARP RIGHT CIRCULAR CONE AT MACH 20.3 AND ANGLES OF ATTACK TO 110 DEG IN HELIUM.
by D. V. Maddalon. Feb 66, 54p NASA-TN-D-3201

Descriptors: *Angle of attack, *Circular cone, *Helium, *Mach number, *Static aerodynamic characteristics.

N66-16090 **Field 1A**
CFSTI Prices: HC$3.00 MF$0.75
Northrop Space Labs., Huntsville, Ala.
A SUPERSONIC/HYPERSONIC AERODYNAMIC INVESTIGATION OF THE SATURN I B/APOLLO UPPER STAGE.
by D. R. Carlson, and W. P. Walters. Jan 66, 78p
Contract NAS8-11111
NASA-CR-362

Descriptors: *Axial stress, *Saturn IB launch vehicle, *Static stability, *Aerodynamic characteristics, *Hypersonic wind tunnel, *Supersonic wind tunnel.

N66-16098 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
Weapons Research Establishment, Salisbury (Australia).
THEORETICAL PRESSURE DISTRIBUTIONS ON A SERIES OF SUPERSONIC WING-BODY COMBINATIONS. PART IV. DELTA WING RESULTS M EQUALS 2.00.
by Y. Y. Chan. 1960, 32p WRE-TM-HSA-88

Descriptors: *Aerodynamics, *Delta wing, *Wing body, *Supersonic pressure distribution.

N66-17888 **Field 1A**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
AERODYNAMIC CHARACTERISTICS OF A 0.0667-SCALE MODEL OF THE X-15A-2 RESEARCH AIRPLANE AT TRANSONIC SPEEDS.
by J. C. Patterson Jr. Mar 66, 76p NASA-TM-X-1198

Descriptors: *Transonic wind tunnel, *Aerodynamic characteristics, *Scale model, *X-15 aircraft.

N66-17889 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
HIGH-LIFT CHARACTERISTICS OF A VARIABLE-SWEEP SUPERSONIC TRANSPORT MODEL WITH A BLENDED ENGINE-FUSELAGE AND ENGINE-MOUNTED HORIZONTAL TAILS.
by V. E. Lockwood. Mar 66, 47p NASA-TM-X-1199

Descriptors: *Variable sweep, *High lift device, *Horizontal tail, *Supersonic commercial air transport (Scat).

N66-17900 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
A METHOD FOR COMPUTING NONEQUILIBRIUM CHANNEL FLOW OF A MULTICOMPONENT GASEOUS MIXTURE IN THE NEAR-EQUILIBRIUM REGION.
by B. S. Baldwin Jr. and W. E. Pearson. Mar 66, 30p NASA-TN-D-3306

Descriptors: *Channel flow, *Gas mixture, *Nonequilibrium, *Numerical analysis.

N66-17905 **Field 1A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
FULL-SCALE WIND-TUNNEL INVESTIGATION OF THE LONGITUDINAL AERODYNAMIC CHARACTERISTICS OF THE M2-F1 LIFTING BODY FLIGHT VEHICLE.
by B. Gamse, and K. W. Mort. Mar 66, 16p NASA-TN-D-3330

Descriptors: *M- 2 lifting body, *Aerodynamic characteristics, *Flight vehicle, *Lift-drag ratio, *Wind tunnel.

N66-18472 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
General Dynamics/Convair, San Diego, Calif.
ATLAS BASE DRAG STUDY.
by R. G. Frayer. 21 Jun 65, 34p GD/C-BTD-65-089
Contract NAS3-3232
NASA-CR-54501

Descriptors: *Atlas launch vehicle, *Ascent trajectory, *Drag, *Flight simulation.

N66-18477 **Field 1A**
CFSTI Prices: HC$3.00 MF$0.75
General Dynamics/Astronautics, San Diego, Calif.
SURVEYOR NOSE FAIRING MODE SURVEY.
by R. L. Radcliffe. 28 Apr 64, 70p Rept. no. 55A3291
Contract NAS3-3232
NASA-CR-54524

Descriptors: *Fairing, *Flight simulation, *Nose cone, *Shell, *Surveyor project.

AD-430 612 **See Field 12A**

AD-635 951 **See Field 1C**

AD-636 099 **See Field 1C**

AD-636 277 **See Field 1C**

1B. AERONAUTICS

AD-466 600 **Field 1B**
CFSTI Prices: HC$3.00 MF$0.50
Ministry of Aviation, London (England).
AN INVESTIGATION INTO BIRD DENSITIES WHICH MIGHT BE ENCOUNTERED BY AN AIRCRAFT DURING TAKE OFF AND LANDING.
by R. W. Sugg. Apr 65, 15p S/T MEMO-6/65

Descriptors: (*Aviation accidents, Birds), Aviation safety, Runways, Airports, Great Britain, Population, Aircraft landings, Take-off, Aircraft wings, Windshields, Mathematical prediction, Damage.

Recordings of bird densities and species on and around runways are discussed with a view to giving guidance for the formulation of a stressing case for bird impacts on aircraft structures, especially windscreens and engines, during take off, landing and low flying across country. Based on some 7,000 observations in the U.K. and bird strike reports from the U.K. and Canada, the most likely species for impact on take off or landing is the gull. It is calculated that a total of 120lbs of bird weight might strike an aircraft of 100 sq ft frontal area during take off or landing.

AD-635 606 **Field 1B, 21D**
CFSTI Prices: HC$1.00 MF$0.50
Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
RESEARCH AND TECHNOLOGY FOR AIRCRAFT FIRE PROTECTION.
by Gunning T. Beery, and Bonito P. Botteri. 8 Jun 66, 19p AFAPL-CONF-66-5
Proj. AF-6075
Prepared for presentation at the Cornell-Guggenheim Aviation Safety Center Aircraft Fluids Fire Hazards Symposium, 7-8 Jun 66, Fort Monroe, Va.

Descriptors: (*Aircraft fires, *Fire safety), (*Jet engine fuels, Aircraft fires), Aerodynamic heating, Flames, Vapors, Kerosene, Aviation safety.

The development of high-performance, advanced aircraft introduces new problems in fire safety. Insufficient knowledge and experience exist to establish accurately the degree of hazard that results from such considerations as aerodynamic heating of surfaces, higher engine operating temperatures, restricted usage of compartment venting procedures, and the behavior of fuel liquids, mists, and vapors under a greater range of temperatures and pressures. Investigations of these problems as well as of the methods and materials for their solution are currently in progress. These programs include the following: (1) An investigation and analysis are underway to provide definite information on fuel system fire hazards of Mach 3 aircraft; the emphasis is on cool flame phenomena. (2) An analysis on the safety of jet fuels has indicated no significant, operational fire-safety advantage of a lower volatility fuel such as kerosene over JP-4. (3) An analysis of the current programs by the Federal Aviation Agency and the U. S. Army on emulsified and gelled fuels indicates that the utilization of such fuels, except for specialized applications, does not appear attractive for jet operations within the U. S. Air Force although the fire safety advantages are significant. (Author)

AD-635 834 **Field 1B**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
GALLOPING OF LANDING GEAR TROLLEYS DURING THE MOVEMENT OF THE AIRCRAFT OVER A DIRT AIRFIELD.
by V. S. Gozdek. 13 May 66, 9p FTD-HT-66-223
TT-66-61793
Unedited rough draft trans. of Inzhenernyi Zhurnal (USSR) v5 n4 p743-5 1965.

Descriptors: (*Landing gear, *Oscillation), (*Vehicle wheels, Landing gear), Aircraft, Landing fields, Aircraft tires, USSR, Stability.

For abstract, see T 66 17.

PB-169 951 **Field 1B**
CFSTI Prices: HC$3.00 MF$0.50
Federal Aviation Agency, Washington, D. C. Systems Research and Development Service.
SCHEDULED AIR CARRIER FLIGHT ACTIVITY IN THE UNITED STATES, NOVEMBER 1965.
Interim rept.
by Ellen S. Reynolds. Feb 66, 31p RD-66-14
Proj. 141-411-01A

Descriptors: (*Commercial planes, Air traffice), (*Transport planes, Air traffic), (*Air traffic, Scheduling), Flight, United States, Numerical analysis.

The report describes flight activity scheduled by commercial air carriers in the United States during November 1965. The basic data source for the report is a magnetic tape prepared by the Reuben H. Donnelley Corporation from air carrier flight schedule data submitted for publication in their November 1, 1965,'Official Airline Guide.' It contains flight data on all international scheduled air carrier flights originating or terminating in the United States and on virtually all domestic scheduled air carrier operations. Flight activity is described in terms of number of Friday flights by airline, aircraft type, hour of day. (Author)

PB-170 388 **Field 1B**
CFSTI Prices: HC$1.50 MF$0.50
National Aviation Facilities Experimental Center, Atlantic City, N. J.
CHARACTERISTICS OF FIRE IN LARGE CARGO AIRCRAFT.
by Julius J. Gassmann. Mar 66, 46p
Proj. 530-001-01X
FAA-ADS-73

Descriptors: (*Aircraft fires, Cargo), (*Transport planes, Fire safety), Aviation safety, Fuselages, Packing materials, Fire alarm systems, Smokes, Aircraft cabins.

An investigation was made to determine the requirements for protecting large cargo aircraft against in-flight cargo fires. Tests were conducted within an instrumented fuselage of a large cargo aircraft using ordinary packing material as cargo. These tests demonstrated the need for suitable detection means, air-flow shutoff controls and adequate insulation properly installed. A procedure was developed which may be useful in conducting in-flight certification tests on smoke detection system installations. A method of generating the smoke was selected on the basis of uniformity, cleanliness and freedom from odor as a result of its use during evaluation. (Author)

PB-170 515 **Field 1B, 17G**
CFSTI Prices: HC$6.00 MF$1.25
Collins Radio Co., Cedar Rapids, Iowa.
COMPUTER/SIMULATION STUDY OF AIR-DERIVED SEPARATION ASSURANCE SYSTEMS IN MULTIPLE AIRCRAFT ENVIRONMENT.
by R. D. Joy, D. E. Killham, and L. K. Belden.
Mar 66, 108p Interim rept. no. 2
Contract FA-WA-4598
Proj. 247-004-01C
FAA-RD-65-35
See also AD-612 363.

Descriptors: (*Aircraft, Separation), (*Air traffic control systems, Aviation safety), Range finding, Altitude, Time, Frequency, Computers, Simulation, Air traffic, Multiple operation, Position finding.

The performance of two classes of air-derived separation assurance systems (ADSAS) were investigated by analytical means, and the most promising system was further studied by computer simulation methods. The two ADSAS classes studied were the range-altitude (R-A) technique using as a primary hazard predictor, tau, the ratio of range to range-rate and the relative position-velocity technique using both tau and the normal velocity

component as hazard predictors. Primary emphasis was placed upon the R-A system using time/frequency ranging techniques. The parameters of this system were varied to maximize its performance. It was concluded: (1) Range-altitude systems based upon the use of time/frequency ranging techniques showed hazard prediction performance superior to those available from the ground-bounce ranging techniques or the relative position-velocity system based upon interrogator-transponder ranging techniques. (2) The time/frequency R-A system gives adequate rectilinear flight performance with rms range measurement errors of 2000 feet and range-rate errors of 30 feet per second. (3) While the simple R-A system will offer complete protection in rectilinear flight regimes, it has serious deficiencies in turning encounters. (4) The use of projection techniques can provide adequate protection for all expected encounters in both en route and terminal areas. (5) Although a R-A system is not completely compatible with all ATC regulations, the interaction is not believed to be a serious problem. (6) The altitude propagation of evasive maneuvers normally does not exceed 1000 feet for the time/frequency ADSAS. (Author)

PB-170 732 **Field 1B**
CFSTI Prices: HC$1.50 MF$1.25
Aviation Safety Engineering and Research, Phoenix, Ariz.
FULL-SCALE DYNAMIC CRASH TEST OF A LOCKHEED CONSTELLATION MODEL 1649 AIRCRAFT.
Technical rept.
by W. H. Reed, S. H. Robertson, L. W. T. Weinberg, and L. H. Tyndall. Oct 65, 182p
Contract FA-WA-4569
FAA-ADS-38

Descriptors: (*Transport planes, Aviation accidents), (*Aviation accidents, Tests), Aviation safety, Aircraft seats, Cargo, Aircraft equipment, Beacons, Safety harness, Radioactive isotopes, Containers, Medical equipment, Lighting equipment, Fuel tanks, Aircraft cabins, Airframes, Recording systems, Airborne.

Identifiers: Cargo restraint systems, Constellation (Aircraft), Flight recorders, Litter beds.

The report provides the details of a full-scale crash test of a large transport aircraft. The purpose of the test was to obtain crash environment data of the test aircraft and the various experiments installed aboard the aircraft. The special experiments consisted of military crew and commercial passenger seats, cargo restraint systems, postcrash locator beacons, baby and child restraint systems, radioactive material containers, a military litter system, and provisions for emergency lighting. The test involved a Lockheed Constellation Model 1649A aircraft, which was guided into a series of crash barriers with a monorail nose gear guidance system. Initial impact occurred against barriers which removed the landing gear, permitting the airplane to become airborne until the moment of impact with the wing and fuselage crash barriers. The wing fuel tanks were ripped open by the wing barriers, allowing simulated fuel to spill out in a heavy mist during the crash sequence. The fuselage was broken in two places during the crash, just aft of the cockpit between fuselage stations 370 and 380 and just aft of the galley between fuselage stations 1020 and 1030. Peak longitudinal accelerations on the order of 25G's were measured at the cockpit floor when the aircraft impacted the 20 degree slope. Most of the onboard experiments remained in their relative locations throughout the test.

PB-170 746 **Field 1B**
CFSTI Prices: HC$1.50 MF$0.50
Human Sciences Research, Inc., McLean, Va.
METHODOLOGICAL CONSIDERATIONS IN THE DESIGN AND CONDUCT OF IN-FLIGHT EVALUATIONS.
Final rept.
by Wallace F. Rollins, and W. S. Vaughan Jr. Jan 66, 35p
Contract FA-WA-4516
Proj. 320-206-01R
SRDS-RD-66-19

Descriptors: (*Flight testing, Experimental design), Human engineering, Training, Flight instruments.

Identifiers: Evaluation.

The report is intended as a general methodological guide to the conduct of in-flight evaluations. Major methodological and procedural requirements of the five phases of a flight evaluation program are presented. These phases include: Planning phase, preparation phase, training phase, pretest phase, final test phase. Special emphasis is given to considerations in the selection and development of criterion measures. (Author)

PB-170 763 **Field 1B, 1D, 14D**
CFSTI Prices: HC$4.00 MF$1.50
Rosemount Engineering Co., Minneapolis, Minn.
FLIGHT CALIBRATION OF AIRCRAFT STATIC PRESSURE SYSTEMS.
Final rept.
by Richard V. DeLeo, and Floyd W. Hagen. Feb 66, 289p REC-76431
Contract FA-64-WA-5025
Proj. 320-205-02N
SRDS-RD-66-3

Descriptors: (*Altimeters, Calibration), Pressure, Flight testing, Test methods, Corrections, Data, Flight instruments.

This report describes four methods of static pressure flight calibration: (1) Camera Fly-Over or Tower Fly-By, (2) Pacer Aircraft, (3) Radar Tracking, and (4) Trailing Probe. The equipment required for each method is listed as well as the accuracy expected and the personnel and flight time required. Complete pre-flight, in-flight, and post-flight procedures and detailed data reduction procedures are described for each method. Data formats are included, as well as suggestions for final data analysis and presentation in correction card form. General background information on the standard atmosphere, altimeters, altimeter errors, and static pressure system errors are included. (Author)

AD-448 067 **See Field 6S**

AD-635 789 **See Field 20K**

AD-635 954 **See Field 1A**

PB-170 573 **See Field 21E**

PB-170 694 **See Field 4B**

1C. AIRCRAFT

AD-635 568 **Field 1C**
CFSTI Prices: HC$1.00 MF$0.50
Army Foreign Science and Technology Center, Washington, D. C.
WINGED GIANT.
by A. Pipko. Jun 66, 13p FSTC-HT-23-104-66
Proj. 2301-6553
TT-66-61765
Trans. of Nauk i Zhizn (USSR) n10 p42-5 1965.

Descriptors: (*Transport planes, USSR), Turboprop engines, Design, Tails (Aircraft). Wings, Fuselages, Aircraft tires, Handling.

Identifiers: AN-22 aircraft.

A general description is given of the Antonov 22 turboprop military transport which was first shown to the Western world at the 1966 Paris Air Show is given together with some of the rationale behind its arrangement - particularly the twin-tail, high wing location, fuselage mounting of the gear, variable tire pressure, ramp geometry.

AD-635 640 **Field 1C, 21E**
CFSTI Prices: HC$13.60 MF$1.00
General Electric Co., Cincinnati, Ohio. Flight Propulsion Lab. Dept.
X-353-5B PROPULSION SYSTEM FLIGHTWORTHINESS TEST REPORT. VOLUME II.
Jan 63, 140p
Contract DA-44-177-TC-715
Rept. on VZ-11 Lift Fan Flight Research Aircraft Program. See also AD-634 950.

Descriptors: (*Propulsion, *Vertical take-off planes), Flight testing, Research planes, Turbojet engines, Ducted fans, Valves, Quality control, Defects (Materials).

Identifiers: V-5 Aircraft, X353-5B Engines.

This volume of the FWT report presents photographs with a brief identification of hardware condition and discrepancies found after completion of tests described in Specifications number 114 and 115. Certificates of inspection are included. Clearance checks were identical with original assembly values. (Author)

AD-635 695 **Field 1C**
CFSTI Prices: HC$19.90 MF$1.25
General Electric Co., Cincinnati, Ohio. Flight Propulsion Lab. Dept.
AIRPLANE DETAIL SPECIFICATION.
22 Apr 63, 170p Specification-118A
Contract DA-44-177-TC-715
Rept. on XV-5A Lift Fan Flight Research Aircraft Program. See also AD-634 943.

Descriptors: (*Vertical take-off planes, Specifications), Design, Ducted fans, Lift, Turbojet engines, Research planes, Propulsion.

Identifiers: V-5 Aircraft, X353-5B Engines.

This specification covers a mid-wing, lift-fan powered research aircraft. It shall be propelled by two G. E. X353-5B propulsion systems. It shall be capable of conventional wing-supported flight at high subsonic speeds. The aircraft shall also be capable of VTOL and STOL in the fan-supported flight mode. The aircraft shall be capable of transition from zero horizontal speed to high horizontal speed and return through transition to hovering flight. It shall be capable of conventional take-off and landing. During wing-supported flight, conventional control surfaces shall be utilized. During fan supported flight, control shall be accomplished through modulation of the air flow through the fans. (Author)

AD-635 796 **Field 1C**
CFSTI Prices: HC$1.00 MF$0.50
Naval Air Engineering Center, Philadelphia, Pa. Aeronautical Materials Lab.
INVESTIGATION OF THE SLOSH VIBRATION REQUIREMENTS OF MIL-T-18847 AND DETERMINATION OF SERVICE LIFE OF FUEL TANKS.
14 Jun 66, 14p NAEC-AML-2448
Task RAE-30C-055/200-1F012-03-02

Descriptors: (*Fuel tanks, Sloshing), (*Aircraft, Vibration), Life expectancy, Helicopters, Military requirements, Vibration isolators, Fighters, Flight testing.

The object of the research was (1) to investigate the vibrations induced in external fuel tanks by military aircraft (fixed and rotary wing) during flight conditions. (2) To determine the average service life of external fuel tanks. (3) To determine on the basis of the information obtained in (1) and (2) above the advisibility of amending the slosh-vibration requirements.

AD-635 951 **Field 1C, 20D, 1A**
CFSTI Prices: HC$4.00 MF$0.75
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.

DEVELOPMENT OF A METHOD FOR PREDICTING THE PERFORMANCE AND STRESSES OF VTOL-TYPE PROPELLERS.
Technical rept.
by Andrew R. Trenka. Jun 66, 126p CAL-BB-1846-S-1
Contract DA-44-177-AMC-75 (T)
Task 1D121401A142
USAAVLABS-TR-66-26

Descriptors: (*Vertical take-off planes, Performance (Engineering)), (*Propellers (Aerial), Stresses), (*Wings, Aerodynamic characteristics), (*Nacelles, Aerodynamic characteristics), Propeller blades, Tests, Aeroelasticity, Thrust, Aerodynamic loading, Mathematical prediction.

The report presents a theoretical method which allows the prediction of performance and stress characteristics of a single VTOL-type of propeller-wing-nacelle combination operating in various flight conditions from hovering through transition and into axial flight. The method includes (1) the effects of a distorted wake, i. e., the effects of contraction and radial and axial velocity variations; (2) the effects of hovering close to the ground; (3) the interference effects from a nacelle and wing buried in the propeller slipstream. Also presented are experimental thrust and torque data. However, because of the insufficient accuracy of the experimental data collected, no definite evaluation of the model is made. (Author)

AD-635 953 **Field 1C**
CFSTI Prices: HC$3.00 MF$0.75
Mississippi State Univ., State College. Dept. of Aerophysics.
FLIGHT TEST EVALUATION OF A DISTRIBUTED SUCTION HIGH-LIFT BOUNDARY LAYER CONTROL SYSTEM ON A MODIFIED L-19 LIAISON AIRCRAFT.
Research rept.
by Sean C. Roberts, Michael R. Smith, and David G. Clark. Jun 66, 75p Aerophysics RR-66
Contract DA-44-177-AMC-265 (T)
Task 1P125901A14203
USAAVLABS-TR-66-36

Descriptors: (*Observation planes, *Boundary layer control systems), Lift, Flight testing, Suction slots, Performance (Engineering), Stability, Roll, Stalling.

Identifiers: O-1 aircraft, Evaluation.

A distributed suction high-lift boundary layer control system fitted to a standard liaison L-19 aircraft increased the aircraft CL max to 5.74 and decreased the take-off and landing distance over a 50-foot obstacle by 38 percent and 29 percent, respectively, with no increase in available power. The modified aircraft demonstrated acceptable stability, control, and handling characteristics in all flight phases, and the stalling characteristics were good, with no rolling tendency. Considerable structural modifications were necessary to obtain the above results. The small holes in the boundary layer control system operated quite successfully for a period of 5 years without clogging due to dust or rain. (Author)

AD-636 099 **Field 1C, 1A**
CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Aerodynamics Lab.
SOME DESIGN PRINCIPLES OF GROUND EFFECT MACHINES. SECTION C - INTERNAL AERODYNAMICS.
Research and development rept.
by Harvey R. Chaplin, and Allen G. Ford. Apr 66, 31p Aero-1100C
Proj. SF013-0113
Task 11274
DTMB-2121C
See also AD-635 468.

Descriptors: (*Ground effect machines, Design), Aerodynamic characteristics, Ducts, Compressors, Gas flow, Fluid dynamic properties.

The power dissipated through losses in the inlet-compressor-ducting system is discussed. A simple illustrative derivation of the characteristics of a hypothetical compressor is carried out. These characteristics are then used to illustrate the construction of combined internal characteristics charts. The dominant influence of the air gap area in determining the necessary size of the compressor (s) is emphasized. (Author)

AD-636 263 **Field 1C**
CFSTI Prices: HC$1.00 MF$0.50
General Electric Co., Cincinnati, Ohio. Advanced Engine and Technology Dept.
WEIGHT ANALYSIS.
Nov 63, 19p Rept. no. 134
Contract DA-44-177-TC-715
Rept on XV-5A Lift Fan, Flight Research Aircraft Program, See also AD-635 695.

Descriptors: (*Vertical take-off planes, Weight), Analysis, Research planes, Design, Ducted fans.

Identifiers: V-5 aircraft.

Aircraft weight increased during the design and manufacturing of the XV-5A, in spite of the close surveillance and careful consideration of the principal program objectives and the best way to meet the needs of the Army. The overweight estimate of 335 pounds becomes secondary when the additional system lift (1000 pounds) is considered. At reduced load factor 3.72 rather than 4.0, the endurance times under VTOL conditions are predicted to be in accordance with the specification. (Author)

AD-636 264 **Field 1C, 1D**
CFSTI Prices: HC$2.00 MF$0.50
General Electric Co., Cincinnati, Ohio. Advanced Engine and Technology Dept.
PRIMARY FLIGHT CONTROL SYSTEMS STRUCTURAL ANALYSIS.
Jan 64, 35p Rept. no. 140
Contract DA-44-177-TC-715
Rept on XV-5A Lift Fan Flight Research Aircraft Program, See also AD-636 263.

Descriptors: (*Vertical take-off planes, *Flight control systems), Structural properties, Analysis, Tests, Mathematical analysis, Structures, Ducted fans.

Identifiers: V-5 aircraft.

The structural analysis of Model XV-5A primary flight control systems is presented in this report. The primary flight control systems consist of conventional stick and rudder pedals mechanically connected to rudder, elevator, and to servo actuators, which control the ailerons, wing-fan exit louvers and nose-fan thrust modulator. The structural analysis is primarily intended to provide load information for the major components. The conventional flight control systems were satisfactorily tested in the airplane by applying limit load to the cockpit controls and reacting the load by locking the surfaces. The wing-fan louver and nose-fan modulator actuating mechanisms were satisfactorily proof tested on the simulator. (Author)

AD-636 277 **Field 1C, 1A**
CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Aerodynamics Lab.
SOME DESIGN PRINCIPLES OF GROUND EFFECT MACHINES. SECTION D - DRAG.
Research and development rept.
by Harvey R. Chaplin, and Allen G. Ford. Jun 66, 31p Aero-1100D
Proj. SF013-0113
Task 11274
DTMB-2121D
See also AD-636 099.

Descriptors: (*Ground effect machines, Design), (*Drag, Ground effect machines), Fluid mechanics.

Six vehicle drag terms are derived. These apply to the sidewall captured air bubble air cushion vehicle and the full-peripheral air cushion vehicle. (Author)

N66-15405 **Field 1C**
CFSTI Prices: HC$1.00 MF$0.50
Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
HYDROPLANING OF AIRCRAFT TIRES.
Quarterly progress rept. no. 3, 15 Apr-15 Jul 65. 15 Jul 65, 12p
Contract NsR-31-003-016
NASA-CR-69331

Descriptors: *Polyurethane, *Aircraft tire, *Hydroplane, *Static testing.

For abstract, see T 66 17.

N66-15644 **Field 1C**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Edwards, Calif. Flight Research Center.
A SUMMARY OF THE X-15 LANDING LOADS.
by J. M. McKay, and R. B. Noll. Feb 66, 13p
NASA-TN-D-3263

Descriptors: *Aircraft landing, *X-15 aircraft, *Landing load.

N66-16164 **Field 1C**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
JET-INDUCED LIFT LOSSES ON VTOL CONFIGURATIONS HOVERING IN AND OUT OF GROUND EFFECT.
by G. L. Gentry, and R. J. Margason. Feb 66, 77p
NASA-TN-D-3166

Descriptors: *Ground effect, *Jet aircraft, *Lift, *Vtol aircraft.

N66-17342 **Field 1C**
CFSTI Prices: HC$2.00 MF$0.50
Litton Systems, Inc., St. Paul, Minn. Applied Science Div.
SUNTRACKER BALLOON FLIGHTS, FLIGHTS 3026, 3028, 3029, AND 3031.
by R. D. Conlon. 18 Aug 65, 41p Rept. no. 2919
Contract NAS7-100
NASA-CR-70383

Descriptors: *High altitude balloon program, *Flight test, *Instrumentation.

N66-18054 **Field 1C**
CFSTI Prices: HC$2.00 MF$0.50
Flying Personnel Research Committee, London (England).
A PHYSIOLOGICAL ASSESSMENT OF A SIMPLE CREW MASK USING A CONSTANT OXYGEN FLOW AND PROVIDING 'SAFETY PRESSURE' DEVELOPED BY NORMALAIR LIMITED (OP.7750).
by A. W. Cresswell, and J. Ernsting. Jun 64, 37p
FPRC/MEMO-207

Descriptors: *Jet aircraft, *Pressure, *Continuum flow, *Oxygen system, *Safety factor.

N66-18055 **Field 1C**
CFSTI Prices: HC$2.00 MF$0.50
Flying Personnel Research Committee, London (England).
THE PHYSIOLOGICAL EVALUATION OF THE FLIGHT CREW OXYGEN EQUIPMENT DEVELOPED BY WALTER KIDDE COMPANY LIMITED FOR THE CIVIL (B.O.A.C.) VC 10 AIRCRAFT.

by A. W. Cresswell. Jun 64, 34p FPRC/MEMO-208

Descriptors: *Flight control, *Transport aircraft, *Oxygen system.

N66-18172 **Field 1C**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Edwards, Calif. Flight Research Center.
DRAG AND WEAR CHARACTERISTICS OF VARIOUS SKID MATERIALS ON DISSIMILAR LAKEBED SURFACES DURING THE SLIDEOUT OF THE X-15 AIRPLANE.
by R. J. Wilson. Mar 66, 28p NASA-TN-D-3331

Descriptors: *X-15 aircraft, *Friction coefficient, *Landing gear, *Skid landing, *Wear.

PB-170 389 **Field 1C, 14C**
CFSTI Prices: HC$3.00 MF$0.75
General Electric Co., Schenectady, N. Y.
FEASIBILITY STUDY OF PROPELLER VIBRATION RECORDING SYSTEM.
by J. B. Gibbons. Mar 66, 121p
Contract FA-64-WA-5046
FAA-ADS-45

Descriptors: (*Propellers (Aerial), Vibration), (*Magnetic recording systems, Feasibility studies), Strain (Mechanics), Magnetic tape, Frequency, Circuits.

Feasibility studies were made of recording propeller strains at 64 positions for 200 hours of flight. The frequency response of the data extended from d.c. to 1000 cps. A system was devised to record the signal characteristics of interest using an intermittently operated magnetic tape recorder to record high level signals at full frequency response and a slow speed recorder to maintain a continuous log of the peak signal history. A key feature of the system is the elimination of slip rings to transmit signals from, and power to, the propellers. Many of the system components are now in production. A few require development. The principal limitation of the system is the difficulty of measuring static strains over a wide temperature range. A method of compensation is proposed which corrects temperature errors over a restricted temperature range. (Author)

AD-635 808 **See Field 20K**

AD-636 094 **See Field 13I**

AD-636 153 **See Field 10C**

AD-636 278 **See Field 19E**

1D. AIRCRAFT FLIGHT CONTROL AND INSTRUMENTATION

N66-15643 **Field 1D**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Edwards, Calif. Flight Research Center.
CONTROL EXPERIENCES OF THE X-15 PERTINENT TO LIFTING ENTRY.
by E. C. Holleman. Feb 66, 16p NASA-TN-D-3262

Descriptors: *Atmospheric entry, *Flight control, *Supersonic aircraft, *X-15 aircraft.

N66-18166 **Field 1D**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
FLIGHT INVESTIGATION OF STEEP INSTRUMENT APPROACH CAPABILITIES OF A T-33 AIRPLANE UNDER MANUAL CONTROL.
by A. W. Hall, and D. J. McGinley Jr. Apr 65, 15p NASA-TN-D-2775

Descriptors: *Manual control, *T-33 aircraft, *Glide slope, *Instrument approach.

AD-636 264 **See Field 1C**

PB-170 763 **See Field 1B**

1E. AIR FACILITIES

PB-169 949 **Field 1E, 13A**
CFSTI Prices: HC$4.00 MF$0.50
National Aviation Facilities Experimental Center, Atlantic City, N. J.
SOME OPERATIONAL CHARACTERISTICS OF IN-PAVEMENT LIGHTING FIXTURES.
Interim rept.
by Cecil B. Phillips. Nov 65, 37p
Proj. 430-204-01X
SRDS-RD-65-133

Descriptors: (*Runways, Marker lights), (*Marker lights, Runways), Operation, Test methods, Lighting equipment, Leakage (Fluids), Vibration, Corrosion, Thermal properties, Illumination, Intensity, Energy conversion, Airports.

The report contains the results of technical tests performed on several types of in-pavement lighting fixtures to determine their operational characteristics. This testing was conducted in the laboratory, on a special test pad or with operational field installations. Test procedures can be developed from these results that will insure the quality of the production fixtures to remain equal to the sample units that were used for the approval testing. (Author)

PB-169 953 **Field 1E, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Naval Air Engineering Lab. (Ship Installations), Philadelphia, Pa. Engineering Dept.
FIXTURE FOR TESTING ABILITY OF INSET RUNWAY GUIDE LIGHTS TO WITHSTAND AIRCRAFT LANDING GEAR LOADS.
Final rept.
by G. M. Henig, and W. J. Biebel. Mar 66, 41p
NAEL-ENG-7373
Proj. 430-204-01E
SRDS-RD-66-17

Descriptors: (*Marker lights, Runways), (*Runways, Marker lights), Airports, Lighting equipment, Shock resistance, Impact shock, Test equipment.

This report contains design data, design parameters, suggested test methods, structural analysis, and suggested additional test functions of a fixture which will test load capabilities of inset runway guide lights. (Author)

PB-170 394 **Field 1E**
CFSTI Prices: HC$4.00 MF$0.50
National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF ICAO RECOMMENDED CATEGORY II APPROACH LIGHT SYSTEMS FOR HIGH PERFORMANCE AIRCRAFT.
Final rept.
by Leslie G. Rutherford. Mar 66, 54p
Proj. 430-201-01V
FAA-RD-66-23

Descriptors: (*Approach lights, Tests), Standardization, All-weather aviation, Jet transport planes, Transport planes, Flight testing, Effectiveness, Runways, Marker lights.

Identifiers: Evaluation, DC-6 aircraft, DC-7 aircraft, Convair 880.

An evaluation of approach lighting for Category II operations was conducted. The evaluation program was performed to achieve, approach light standardization within the inner 1000 feet of the system for Category II operations. Tests were carried out in simulated and actual Category II weather conditions. Twenty-five subjects flying a DC-6B aircraft and seven subjects flying a Convair 880 aircraft participated in the weather simulation phase. Two subjects flying a DC-7 aircraft and seven subjects flying Gulfstream aircraft participated in the actual weather phase. Test results indicated that the following modifications to the inner 1000 feet of the United States Standard ALS would substantially improve approach success for high-performance aircraft in Category II operations. (1) Add red side rows of barrettes in line with the runway touchdown-zone barrettes. (2) Add a white cross-bar 500 feet from threshold between the rows of red barrettes. (3) Fill in the gap at threshold by continuing white-centerline and red-side-row barrettes to within 100 feet of the threshold. (4) Delete the red-wing bars 100 feet from the threshold. (5) Delete the condenser-discharge lights. It is recommended that a service test be conducted on the system at a major international airport having a high percentage of low visibility conditions. (Author)

PB-170 399 **Field 1E**
CFSTI Prices: HC$6.00 MF$0.50
National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF MINIMUM APPROACH LIGHT SYSTEM FOR LOWER ACTIVITY AIRPORTS.
Interim rept.
by Thomas H. Paprocki, and Robert F. Gates.
Feb 66, 49p
Proj. 430-209-01V
FAA-RD-66-11

Descriptors: (*Approach lights, Flight testing), Guidance, Visual signals, Visibility, Runways, Effectiveness, Airports, Instrument landings, All-weather aviation.

Identifiers: Evaluation.

Flight tests were conducted during actual Category I weather conditions to determine the suitability of three approach light patterns in providing guidance for aircraft approach speeds of 125 knots using ILS into lower activity airports. Each pattern tested provided less visual guidance (fewer lights)than the U. S. Standard Approach Light System. A fourth pattern which was not available during the weather period will be evaluated and test results reported at a later date. It was concluded that the minimum pattern provided adequate visual guidance in a Category I visibility condition with a high approach success rate provided a minimum decision height of 150 feet is authorized with reported ceilings of 200 feet and higher. Several amendments to operating practices were suggested to permit flight to a minimum decision height below a reported ceiling height. It was also concluded that runway visual range alone provided a poor indication of what approach light contact height to expect and, consequently, there was a requirement to provide slant visibility measurements to improve the approach success rate. (Author)

2A. AGRICULTURAL CHEMISTRY

PB-170 414 **See Field 2D**

2C. AGRICULTURAL ENGINEERING

PB-170 580 **See Field 13B**

2D. AGRONOMY AND HORTICULTURE

PB-170 414 **Field 2D, 2A, 2E**
CFSTI Prices: HC$6.00 MF$0.75
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Land Research.

KATHERINE RESEARCH STATION 1956-64: A REVIEW OF PUBLISHED WORK.
Technical paper.
by M. J. T. Norman. 1966, 84p TP-28

Descriptors: (*Agriculture, Scientific research), Australia, Climate, Soils, Fertilizers, Plants (Botany), Grasses, Growth, Food, Bovines, Reviews.

The report follows the Katherine Research Station Progress Report, 1946-56 (CSIRO Aust. Division of Land Research and Regional Survey 1959), which summarized 10 years of largely unpublished experimental results. As most of the results since 1956 have already been published under the names of the officers concerned, the report takes the form of a review of published work. The review is divided into sections dealing with research on soil fertility, arable crops, native pastures, sown pastures, annual fodder crops, and beef cattle. These sections are preceded by a brief summary of the environment of the area. (Author)

PB-170 583 **Field 2D**
CFSTI Prices: HC$4.00 MF$0.50
Weather Bureau, Quincy, Fla.
COLDFRAME MICROCLIMATES UNDER SOLID AND PERFORATED PLASTIC COVERS.
Agricultural Metrology rept.
by D. R. Davis, and C. E. Dean. Apr 66, 11p
WB-TN-38-AGMET-4

Descriptors: (*Protective coverings, Plants (Botany)), (*Plants (Botany), Protective coverings), (*Micrometeorology, Plants (Botany)), Polyethylene plastics, Laminated plastics, Textiles, Atmospheric temperature, Soils, Humidity.

Identifiers: Coldframes.

Microclimatic variables were measured in three plant beds covered with materials having 1/4 in. perforations on a 3-in. square pattern and in one plant bed covered with nonperforated clear polyethylene plastic. One of the perforated covers was clear polyethylene plastic, one was a lamination of white cloth and polyethylene plastic, and the third was a laminatyellow cloth and polyethylene plastic. Data are presented to show how the microclimate parameters of a coldframe covered with a nonperforated clear plastic film were modified when the cover had perforations, or perforations and cloth laminations. Emphasis is given to the modification of the temperature regime, especially on clear warm days when temperatures in conventional coldframes covered with nonperforated plastic film tend to become excessive for tender plants. (Author)

AD-635 588 **See Field 4B**

PB-170 582 **See Field 6C**

2E. ANIMAL HUSBANDRY

PB-170 414 **See Field 2D**

2F. FORESTRY

PB-170 297 **See Field 5C**

PB-170 407 **See Field 11L**

PB-170 606 **See Field 11L**

3A. ASTRONOMY

AD-635 928 **Field 3A**
CFSTI Prices: HC$3.00 MF$0.75
Observatoire de Paris (France).
POLARIMETRIC STUDY OF THE PLANET MARS.
Final scientific rept.
by Audouin Dollfus, and John H. Focas. 30 Apr 66, 61p
Contract AF 61 (052)-508
AFCRL-66-492

Descriptors: (*Mars (Planet), Polarimetric analysis), (*Soils, Mars (Planet)), (*Planetary atmospheres, Mars (Planet)), Minerals, Iron compounds, Oxides, Coatings, Periodic variations, Barometric pressure, Aerosols, Vapors, France.

Analysis was made of five thousand two hundred measures of the polarized light of Mars, collected during the last nine apparitions of this planet, since 1948. The polarization curves for the bright and the dark areas of the planet are reproduced for each one of the apparitions. The variation of the polarization for the spectral range 1.05 to 0.45 micron is examined. A polarimetric and photometric study of selected samples of minerals indicated the presence, in the bright areas of the planet, of a fine powder of hydrated iron oxide of the limonite type. The seasonal variation of the polarizing properties of the dark areas of Mars follows closely the variation of their darkness at Martian spring; this suggests a seasonal modification of their microscopic contexture. The luminance of the atmosphere of the planet amounts, for a wavelength of 0.61 micron, to Ka (0.61 micron) = 0.0006 stilb/phot; this corresponds to a surface pressure of 30 millibars. The scattering coefficient of the atmosphere at 0.47 micron is Ka (0.47 micron) = 0.00151 stilb/phot. This value shows that the atmosphere of the planet is much too transparent in the blue to mask the markings of the soil.

N66-13163 **Field 3A**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Univ., Calif. Stanford Electronics Lab.
LUNAR RADAR MEASUREMENTS OF THE EARTH'S MAGNETOSPHERIC WAKE.
Scientific rept. no. 11.
by V. R. Eshleman, H. T. Howard, B. B. Lusignan, and P. Yoh. Aug 65, 19p SEL-65-085
Grant NsG-377
NASA-CR-68539

Descriptors: *Earth radiation, *Lunar echo, *Electron density, *Magnetosphere, *Radar echo.

For abstract, see T 66 17.

N66-14636 **Field 3A**
CFSTI Prices: HC$3.00 MF$0.50
Florida State Univ., Tallahassee. Radio Astronomy Observatory.
A CATALOG OF RADIO OBSERVATIONS OF JUPITER 1961-1964.
by C. H. Barrow, D. Morrow, and G. M. Resch. 1965, 58p
Grant NsG-224
NASA-CR-69110

Descriptors: *Radio observation, *Jupiter (Planet).

N66-14639 **Field 3A**
CFSTI Prices: HC$2.00 MF$0.50
Kansas State Univ., Manhattan. Dept. of Physics.
SPACE ENVIRONMENT ANALYSES, HUMAN PERFORMANCE STUDIES, AND GRAVITATIONAL FIELD EFFECTS ON ENZYMATIC REACTIONS.
by E. B. Dale. 1965, 45p
Contract NsG-692
NASA-CR-69106

Descriptors: *Enzyme activity, *Gravitational effect, *Human performance, *Space environment.

N66-14752 **Field 3A**
CFSTI Prices: HC$5.00 MF$1.00
Eastman Kodak Co., Rochester, N. Y. Apparatus and Optical Div.
LUNAR PHOTO STUDY.
Final rept. 1 Dec 64-1 Oct 65.
by G. T. Keene. 1 Oct 65, 159p Z-3841
Contract NAS9-3826
NASA-CR-65190

Descriptors: *Astronomical model, *Copper oxide, *Lunar photograph, *Photometry.

N66-15578 **Field 3A**
CFSTI Prices: HC$5.00 MF$1.00
Research Labs. Div., Bendix Corp., Southfield, Mich.
MASS SPECTROMETER FOR LUNAR ANALYSIS STUDY.
Final summary rept. 1 Jun-31 Aug 63.
by L. D. Ferguson, G. J. Ohalloran, F. W. Poblenz, and L. Walker. 30 Nov 63, 180p RLD-2542
Contract NAS8-5370
NASA-CR-69447

Descriptors: *Atmospheric composition, *Lunar composition, *Mass spectrometry.

N66-15626 **Field 3A**
CFSTI Prices: HC$6.00 MF$1.25
National Academy of Sciences-National Research Council, Washington, D. C. Space Science Board.
SPACE RESEARCH. DIRECTIONS FOR THE FUTURE. PART TWO.
Jan 66, 223p
Contract NsR-09-012-903
NASA-CR-69494

Descriptors: *Astrophysics, *Research project, *Geophysics, *Space science.

AD-453 476 **See Field 12A**

AD-635 760 **See Field 7D**

AD-635 958 **See Field 3C**

PB-170 897 **See Field 22C**

PB-170 898 **See Field 22C**

3B. ASTROPHYSICS

AD-635 847 **Field 3B**
CFSTI Prices: HC$6.00 MF$0.75
RAND Corp., Santa Monica, Calif.
REDUCTION OF THE EQUATIONS OF RADIATIVE TRANSFER FOR A PLANE-PARALLEL, PLANETARY ATMOSPHERE, PART II.
by Zdenek Sekera. Jul 66, 69p RM-5056-PR
Contract AF 49 (638)-1700
See also AD-635 284.

Descriptors: (*Planetary atmospheres, *Transport properties), Rayleigh scattering, Matrix algebra, Vector analysis, Integral equations.

Identifiers: Radiative transfer.

A presentation of mathematical techniques necessary in unique solution of equations of radiative transfer in a homogeneous atmosphere with Rayleigh scattering. The singular linear integral equations for the X- and Y-matrices appearing in the azimuth-independent terms of the reflection and transmission matrices for the emerging radiation from a homogeneous, plane-parallel atmosphere with Rayleigh scattering are reduced to four pairs of scalar equations of the forms discussed by T. W. Mullikin. The nonuniqueness in the solutions of one of these pairs of equations is removed by using linear constraints. The solutions are finally expressed as linear combinations of Chandrasekhar's functions and are brought to the same form as that derived by Chandrasekhar, but by completely different methods. The new forms of the solutions are particularly suitable from the computational point of view when large optical thicknesses are involved. Mathematical expressions corresponding to physical quantities such

as directional radiation and total fluxes emerging from a Rayleigh scattering atmosphere are also derived. (Author)

AD-635 861 **Field 3B**
CFSTI Prices: HC$6.00 MF$1.25
Smithsonian Astrophysical Observatory, Cambridge, Mass.
SOME NEW ALGORITHMS FOR STELLAR STRUCTURE.
Special rept. on Research in Space Science.
by Peter D. Usher. 27 May 66, 201p SAO-SR-213
Prepared in cooperation with Harvard Coll. Observatory, Cambridge, Mass.

Descriptors: (*Stars, *Interstellar matter), (*Algorithms, Astrophysics), Boundary valve problems, Perturbation theory, Model theory.

For abstract, see T 66 17.

AD-635 974 **Field 3B, 4A**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Berkeley. Space Sciences Lab.
LONGITUDE DISTRIBUTION OF PROTON FLARES AS A FUNCTION OF RECURRENCE PERIOD.
Technical rept.
by John M. Wilcox, and Kenneth H. Schatten. 6 Jul 66, 13p Series-7-Issue-25
Contract Nonr-3656 (26), Grant NsG-243-62
Proj. NR-021-101

Descriptors: (*Solar flares, *Protons), Sunspots, Periodic variations, Upper atmosphere, Proton bombardment, Cosmic rays.

The longitude distribution of the solar flares that produced high-energy protons detected at the earth during the past 11-year sunspot cycle is examined. The synodic rotation period is not confined to be the Carrington period (27.2753 days) which corresponds to the use of heliographic longitude, but instead a range of rotation periods from 25 to 34 days is examined in increments of 0.01 days. It is concluded that the apparent tendency of these proton flares to cluster within one hemisphere of heliographic longitude is not statistically significant. (Author)

N66-15398 **Field 3B**
CFSTI Prices: HC$1.00 MF$0.50
Cambridge Univ. (England). Dept. of Applied Mathematics and Theoretical Physics.
A MODEL OF THE QUASI-STELLAR RADIO VARIABLE CTA 102.
by M. J. Rees, and D. W. Sciama. 1965, 11p
Grant NsG-58
NASA-CR-69349

Descriptors: *Radio source, *Star, *Flux density, *Spectral emission.

For abstract, see T 66 17.

N66-15478 **Field 3B**
CFSTI Prices: HC$1.00 MF$0.50
Texaco Experiment, Inc., Richmond, Va.
A THEORETICAL STUDY OF THE PROPAGATION AND ATTENUATION OF ACOUSTIC WAVES IN THE LUNAR SURFACE.
Interim rept.
by R. E. Canup, and R. L. Wolf. 9 Feb 62, 17p EXP-387
Contract JPL-950155
NASA-CR-69393

Descriptors: *Acoustic radiation, *Lunar environment, *Wave propagation.

N66-15616 **Field 3B**
CFSTI Prices: HC$1.00 MF$0.50
Wisconsin Univ., Madison.
STELLAR SPECTROPHOTOMETRY IN THE FAR ULTRAVIOLET.
Final rept. Jul 59 - Dec 63.
by A. D. Code. 1964, 16p
Contract NASw-66
NASA-CR-69482

Descriptors: *Vacuum ultraviolet, *Calibration, *3X-15 Aircraft.

N66-15673 **Field 3B**
CFSTI Prices: HC$2.00 MF$0.50
Bern Univ. (Switzerland). Physikalisches Institvt.
RARE GAS MEASUREMENTS IN 30 STONE METEORITES.
by P. Eberhardt, O. Eugster, J. Geiss, and K. Marti. Nov 65, 43p

Descriptors: *Chrondrite, *Meteorite, *Argon, *Helium, *Neon.

N66-17246 **Field 3B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
A BIBLIOGRAPHY OF MULTIPLE NIGHTLY OBSERVATIONS OF COMET TAILS.
by S. Plagemann. Sep 65, 18p NASA-TM-X-55370, X-612-65-362
Grant NsG-695

Descriptors: *Astronomical photography, *Comet, *Bibliography.

N66-17733 **Field 3B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
COSMOLOGY WITHOUT GENERAL RELATIVITY.
by E. R. Harrison. Mar 66, 15p NASA-TN-D-3212

Descriptors: *Physics (GEN), *Cosmology, *Newton theory, *Relativity.

N66-18321 **Field 3B**
CFSTI Prices: HC$3.00 MF$0.75
Lockheed Missiles and Space Co., Sunnyvale, Calif.
ASTEROID BELT AND JUPITER FLYBY STUDY.
Bimonthly progress rept. no. 1.
15 Sep 64, 83p LMSC-M-49-64-2
Contract NAS7-100
NASA-CR-70580

Descriptors: *Asteroid, *Experiment design, *Jupiter project, *Scientific satellite, *Flyby mission.

N66-18444 **Field 3B**
CFSTI Prices: HC$2.00 MF$0.50
Space Technology Labs., Inc., Redondo Beach, Calif.
A REVIEW OF THE PHYSICS OF COMETS AND ITS EXPERIMENTAL INVESTIGATION BY AN INSTRUMENTED SPACE PROBE.
by W. Bernstein, and R. Doolittle. 22 Feb 63, 32p STL-8668-6001-RU-000
Contract NASW-414
NASA-CR-70823

Descriptors: *Astrophysics, *Chemical property, *Comet, *Cosmology, *Physical property, *Space probe.

AD-635 622 **See Field 4A**

3C. CELESTIAL MECHANICS

AD-635 958 **Field 3C, 3A**
CFSTI Prices: HC$1.00 MF$0.50
Minnesota Univ., Minneapolis. Observatory.
PROPER MOTION SURVEY WITH THE FORTY-EIGHT INCH SCHMIDT TELESCOPE. IX. SIX REGIONS IN THE HYADES.
by William J. Luyten. 1966, 24p
Contract Nonr-5060 (00)
Proj. NR-046 752

Descriptors: (*Celestial mechanics, *Stars), Position finding, Photographic recording systems, Astronomical data, Tables.

Identifiers: Hyades Region.

In continuation of the three regions in the Hyades reported on in No. V of this series data are given for 1617 proper motion stars found in six more pairs of plates taken with the forty-eight inch Schmidt telescope on regions in the Hyades. Two of these regions - P 357 and P 414 - were among the very earliest examined and data on the motions of some 350 stars found in them were published in Vol. III, No. 11 of the Publications of the Observatory of the University of Minnesota. In order to have all the data on the entire region of the Hyades conveniently available in the publication of the present series they are again given herewith. (Author)

N66-12184 **Field 3C**
CFSTI Prices: HC$7.00 MF$1.75
Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile and Space Systems Div.
NUMERICAL RESIDUAL PERTURBATION SOLUTIONS APPLIED TO THE PROBLEM OF A CLOSE SATELLITE OF THE SMALLER BODY IN THE RESTRICTED THREE-BODY PROBLEM.
by M. C. Eckstein, H. A. Holman, and J. C. Walker. Sep 65, 306p SM-49213
Contract NASw-901
NASA-CR-68122

Descriptors: *Prediction theory, *Satellite perturbation, *Three-body problem.

For abstract, see T 66 17.

4A. ATMOSPHERIC PHYSICS

AD-635 603 **Field 4A**
CFSTI Prices: HC$1.00 MF$0.50
Pennsylvania State Univ., University Park. Ionosphere Research Lab.
AN IONOSPHERIC ESTIMATE OF NITRIC OXIDE CONCENTRATION IN THE D-REGION.
by Ashesh P. Mitra. 15 Feb 66, 27p Scientific-265
Contract AF 19 (628)-4014, Grant NSF-GP-5611
Proj. AF-8605
Task 860502
AFCRL-66-359

Descriptors: (*Ionosphere, *Nitrogen compounds), Oxides, Concentration (Chemistry), Solar radiation, Periodic variations, X-rays, Cosmic rays, Sunspots, Photochemistry.

Identifiers: Nitrogen oxides.

It is shown that the dissimilar nature in the solar cycle variations in the three major competing ionizing sources for the D-region (e.g. X-rays below 8A, Lyman-alpha and cosmic rays) can be used to provide an estimate for the concentration of the neutral nitric oxide at and near 70 km. Use of the electron density profiles recently given by Deeks (Radio space Res. Sta. Int. Memo. 219, 1965) for sunspot minimum and maximum conditions for equinox in middle latitudes gives a nitric oxide concentration of 400,000/cu. cm. around 72 km, about one hundredth of Barth's rocket-deduced value. When this value is integrated with currently available photochemical information, the following empirical distribution is indicated: n (NO)=0.02 exp (-3300/T)n (O2) ;0.0000005n (O). (Author)

AD-635 604 **Field 4A, 22B, 14B**
CFSTI Prices: HC$6.00 MF$1.25
Utah Univ., Salt Lake City. Upper Air Research Labs.

DIRECT IN SITU MEASUREMENTS OF AURORAL PARAMETERS.
by Kay D. Baker. 6 May 66, 202p Scientific-4, UU-66-8
Contract AF 19 (628)-4995
Proj. AF-7663
Task 766303
AFCRL-66-413

Descriptors: (*Aurorae, *Atmospheric sounding), Sounding rockets, Instrumentation, Measurement, Photochemistry, Atmosphere, Launching sites, Canada.

Three rockets were fired into visible auroral forms from Ft. Churchill, Manitoba, Canada in the winters of 1964 and 1965. The rocket payloads contained a complex array of instruments in a program to simultaneously conduct direct in situ measurements of many important auroral parameters. The techniques and results of these measurements are presented followed by a discussion on the interrelationships between the atmospheric ionization, heating, excitation, and auroral light emission, resulting from the energetic electron flux interacting with the atmosphere.

AD-635 622 **Field 4A, 3B**
CFSTI Prices: HC$2.00 MF$0.50
Cornell Aeronautical Lab., Buffalo, N. Y.
1965 SOLAR ECLIPSE PARTIAL REFLECTION EXPERIMENT.
Final technical rept.
by H. Andreas von Biel. Dec 65, 1 43p CAL-VS-2025-P-1
Contract DA-49-146-XZ-403

Descriptors: (*Solar eclipses, *Atmospheric sounding), (*Ionosphere, Atmospheric sounding), Radio waves, Ionospheric propagation, Electron density, Refractive index, Magneto-optic effect.

Identifiers: D-region, Partial reflection experiment.

A partial reflection experiment, conducted on Aitutaki, Cook Island, before, during and after the 1965 Solar Eclipse, is described. A small portion of the data collected during the expedition is presented in the form of ten electron density profiles collected between the times of 13 minutes before totality until two and one half hours after totality. Also included is a three day noon-time average electron density profile for comparison purposes. The statistics of D-region echoes are described and their implications are discussed. The general conclusion from the data is that the solar eclipse caused little, or no changes in the electron density distribution at altitudes below 75 km. The predominant eclipse effects were noticed at altitudes of 78 km and higher. The data presented also suggest that the D-region electron density recovered to near normal in a time interval of about 80 minutes after totality. Even though the data analyzed are too few to reach definite conclusions regarding the electron density history during the eclipse, the trends evident from the results are sufficiently well defined to establish the usefulness of the experimental technique for D-region investigation during a solar eclipse. (Author)

AD-635 818 **Field 4A, 20H**
CFSTI Prices: HC$1.00 MF$0.50
Midwestern Universities Research Association, Stoughton, Wis.
A SEARCH FOR MASSIVE PARTICLES IN COSMIC RAYS.
by B. Dayton, F. Mills, C. Radner, L. W. Jones, and U. Camerina. 18 Apr 66, 28p MURA-718
Contract AT (11-1)-718
Prepared in cooperation with Michigan Univ., Ann Arbor, Contract Nonr-1224 (23); and with Wisconsin Univ., Madison. Supported in part by NSF.

Descriptors: (*Cosmic rays, *Elementary particles), Nuclear spectroscopy, Cosmic ray bursts, Nuclear cross sections, Atmosphere.

A search for long-lived particles (> approx. 0.000006) of mass in the range of about 5-15 BeV was carried out among cosmic rays at the summit of Mt. Evans, Colorado, by measuring time intervals between the arrival of strongly interacting particles of energy > approx. 70 GeV and accompanying air shower particles. From the absence of delayed strongly interacting particles in the range 40-180 ns where particles of nucleonic mass are not allowed, it is concluded that an upper limit of 160 microbarns/nucleon could be placed on the cross-section for production of particles of mass around 8 BeV at energies not far above threshold in nucleon-nucleon collisions. This limit is subject to certain restrictive assumptions about the behavior of the hypothetical massive particles, which are discussed. (Author)

AD-635 827 **Field 4A, 4B**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
THE AMOUNT OF SUMMER LIGHTNING OVER THE EUROPEAN USSR.
by N. I. Leushin. 25 May 66, 18p FTD-TT-65-1798
TT-66-61789
Unedited rough draft trans. of Meteorologiya i Gidrologiya (USSR) n9 p22-8 1964.

Descriptors: (*Lightning, USSR), Thunderstorms, Distribution, Maps, Climatology, Direction finding, Meteorological parameters, Weather forecasting.

The article describes a method of constructing charts of lightning distribution over the European USSR on the basis of data obtained during the period 1958-1960 by means of the European cluster of direction-finding equipment. Characterizing thunderstorm activity not by the number of thunderstorm days, but by the number of lightning strokes in the examined territory is proposed. The direction-finding method makes it possible to obtain charts of the average distribution of discharges in various periods. These charts make it possible to trace the development of thunderstorm activity during a day.

AD-635 866 **Field 4A**
CFSTI Prices: HC$3.00 MF$0.50
Saskatchewan Univ., Saskatoon. Inst. of Upper Atmospheric Physics.
BASIC RESEARCH ON AURORA AND AIRGLOW.
Final rept. 1 May 63-30 Apr 66.
by A. Vallance Jones, H. N. Rundle, and E. J. Llewellyn. 30 Jun 66, 50p
Contract AF 19 (628)-2829
Proj. AF-7661
Task 766102
AFCRL-66-343

Descriptors: (*Aurorae, Instrumentation), (*Sky brightness, Instrumentation), Interferometers, Spectrum analyzers, Infrared spectroscopy, Photometers, Oxygen, Band spectrum, Nitrogen, Excitation, Canada.

Spectroscopic grating and interferometric instruments currently in use for the spectroscopy and photometry of the aurora and airglow are listed and descriptions are given of the most recently developed instruments. A balloon-borne photometer for the infrared is described. Measurements of alkali metal abundances in the atmosphere from twilight observations are reported, including enhancements following artificial injections. Experimental and theoretical observations of the 1.27 micron and 1.58 micron O2 band in the twilight and dayglow are described including recent results obtained from balloons. An investigation on the relative band intensities and excitation of the nitrogen band systems in aurora was completed and the results are reported. Temperatures were obtained from the rotational structure of the first positive group N2 and Vegard-Kaplan bands in aurora. Lifetimes and quenching cross sections for O singlet-S were obtained from multichannel photometer observations of auroral brightness fluctuations. High resolution spectra of the OH bands in the 1 - 2 micron infrared region were obtained with a Michelson interferometer. A synoptic program for the determination of the time and space distributions of proton and electron bombardment of the atmosphere from the analysis of patrol spectra is described. (Author)

AD-635 883 **Field 4A, 16D**
CFSTI Prices: HC$5.00 MF$1.00
Utah Univ., Salt Lake City. Upper Air Research Lab.
DROPOUT PROBE TECHNIQUES FOR IN SITU MEASUREMENTS OF MISSILE PLUME OPTICAL RADIANCE CHARACTERISTICS.
Final rept., 1 Jul 63-30 Jun 65.
by D. A. Burt, K. G. Olsen, P. S. Selander, L. C. Howlett, and G. D. Allred. Jan 66, 176p UU-66-5
Contract AF 19 (638)-3243, ARPA Order-363
Proj. AF-8662
AFCRL-66-108

Descriptors: (*Exhaust gases, Probes), (*Condensation tails, Probes), Optical properties, Upper atmosphere, Test methods, Instrumentation, Guided missile components, Jettisonable equipment, Magnetometers, Flight testing.

Identifiers: Rocket exhaust plumes.

Dropout capsules incorporating instruments capable of measuring the optical properties of missile plumes and the instrumentation to assist in determining the capsule's aspect within the plume were designed and developed. Experiments wherein the capsules were dropped from scientific passenger pods attached to Atlas and Titan II missiles through the plumes of the in-flight missiles were conducted. Eight capsules were constructed and seven have been flown. The capsule instrumentation, integration and description of operation, as well as two extensive sections dealing with methods of determining capsule aspect within the plume are discussed. (Author)

AD-635 914 **Field 4A**
CFSTI Prices: HC$5.00 MF$1.00
Florida State Univ., Tallahassee. Dept. of Meteorology.
THE VERTICAL DISTRIBUTION OF OZONE OVER TALLAHASSEE, FLORIDA.
Interim rept.
by Philip R. Sticksel. 15 Jun 66, 158p Rept. no. 66-3, Scientific-1
Contract AF 19 (628)-4953, Grant NSF-GP-2393
Proj. AF-8628
Task 862807
AFCRL-66-351

Descriptors: (*Ozone, Atmosphere), (*Atmosphere, Florida), Atmospheric sounding, Tropopause, Jet streams (Meteorology), Meteorological balloons, Radiosondes, Distribution, Data.

158 Regener chemiluminescent ozonesondes were launched from Tallahassee, Florida, as part of a three-year synoptic sounding program for the investigation of the vertical distribution of ozone over North America. In general, there was a single maximum of ozone density located near 23 km above Tallahassee throughout the year. The increase to this maximum began at the tropical tropopause and at least 80 per cent of the total amount of ozone was located above this tropopause. Relative maxima below this level occurred during the first half of the year and their appearance could be related to the presence of the subtropical jet stream south of Tallahassee and to the horizontal movement of 'ozone clouds' within the layer between the tropical and subtropical tropopauses. The formation process of these secondary maxima was investigated by constructing isentropic trajectories to trace the movements of the maxima. An inquiry into the cause of a 40 per cent variation of total ozone during a 10-day period indicated that

it resulted primarily from horizontal and vertical motions between 16 and 24 km and secondarily from horizontal advection between 12 and 16 km. In both layers these processes were found to be under the control of middle latitude circulation systems. (Author)

AD-635 926 **Field 4A**
CFSTI Prices: HC$1.00 MF$0.50
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
HORIZONTAL AND VERTICAL DISTRIBUTIONS OF ATMOSPHERIC PRESSURE, 30 TO 90 KILOMETERS.
Air Force Surveys in geophysics.
by Arthur J. Kantor. May 66, 19p AFCRL-AFSIG-181, AFCRL-66-346
Proj. AF-8624
Task 862401

Descriptors: (*Stratosphere, *Barometric pressure), Periodic variations, Temperature, Diurnal variations, Distribution.

The distribution with latitude of atmospheric pressure is such that mean monthly pressures generally increase toward the Equator in winter and toward the Pole in summer. The mean maximum January gradient lies between 60 and 40 degrees N, where the pressure changes by roughly one percent of standard per degree of latitude. The height of smallest change is near 85 km. The largest January and July departures from standard occur near 65 km in the arctic where the minimum January value is 65 percent of standard and the maximum in July is 130 percent of standard. A pressure increase near 60 km of more than seven percent per degree of latitude can result from coexistence of cold and warm winter stratospheric thermal regimes within 600 miles over arctic regions. An extreme vertical pressure gradient of 23 percent decrease per km may exist near 85 km for the coldest observed temperature, 130 degree K, at this level. Day-to-day variability of pressure increases with the latitude and altitude to near 65 km. Estimated 2 standard deviations near 65 km reach plus or minus 35 percent during 60 degrees N winter. Theoretical diurnal pressure variations increase with height above 30 km to at least 80 km. (Author)

AD-635 977 **Field 4A, 4B**
CFSTI Prices: HC$3.00 MF$0.75
Atmospheric Research Lab., Univ. of Oklahoma Research Inst., Norman.
A CONSIDERATION OF SOME OF THE FACTORS AFFECTING ATMOSPHERIC COMPOSITION, STATIC STABILITY AND MOTION BETWEEN 20 AND 100 KM.
Final rept., 1 Mar 65-30 Mar 66.
by V. S. Whitehead, M. D. Miller, and W. J. Saucier. Apr 66, 90p ARL-1489-1
Contract AF 19 (628)-4767,
Proj. AF-8624
Task 862402
AFCRL-66-333

Descriptors: (*Upper atmosphere, Meteorology), (*Ozone, Upper atmosphere), (*Stratosphere, *Atmospheric motion), (*Wind, Stratosphere), Oxygen, Chemical equilibrium, Concentration (Chemistry), Density, Stability, Troposphere, Coriolis effect, Viscosity.

The equilibrium concentrations of atomic oxygen and ozone between 30 and 80 kilometers as a function of zenith angle were computed. The time change of these constituents after darkness were computed for the case of no outside source of ozone and atomic oxygen and for the case where diffusion or mixing kept the supply of atomic oxygen at one percent of the sundown value. Regions of the mesosphere which should support enhanced mixing are determined by considering the distribution of density as a function of altitude, latitude, and time of year. Figures depicting the regions of preferred relative maximum of mixing are included. The effects that Coriolis force and viscous forces have on upper mesospheric and lower thermospheric winds are shown. It is demonstrated that viscous forces can generate a wave form in an atmosphere driven by periodic motion at the top. And it is shown that the Coriolis effect can cause an apparent upward or downward propagation of an existing wave form. (Author)

AD-636 050 **Field 4A, 4B, 20C**
CFSTI Prices: HC$4.00 MF$1.00
Honeywell, Inc., St. Paul, Minn. Systems and Research Div.
STUDY OF LOW FREQUENCY ELECTRICAL CHARACTERISTICS OF CLEAR AIR TURBULENCE AND STORM FRONT CENTERS.
Final rept., 15 Mar-15 Sep 65.
by Henry W. TenBroek, and Charles R. Seashore.
Feb 66, 120p Rept. no. 12011-FR-1
Contract AF 19 (628)-5060
Proj. AF-6020
Task 602003
AFCRL-66-240

Descriptors: (*Clear air turbulence, *Electrostatic fields), (*Atmospheric electricity, Clear air turbulence), Atmospheric sounding, Probes (Electromagnetic), Storms, Cumulus clouds, Low frequency, Electrical properties.

This report covers work done in investigating the low frequency electrostatic field characteristics of clear air turbulence and storm front regions. The general theory describing the field sensing antennas is presented in addition to the practical aspects of those antennas actually utilized in the program. The electronic instrumentation used in data gathering flights and subsequent data reduction is described; and the data from one ridgeline turbulence encounter and three storm front flights is analyzed with respect to frequency content in decade bandwidths from 0.1 to 10,000 cps. Results from the turbulence flight reveal signals due to the turbulence which differ from pre- and post-encounter norms and present the possibility of anticipating the encounter. (Author)

AD-636 093 **Field 4A, 20H**
CFSTI Prices: HC$2.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash. Geo-Astrophysics Lab.
AN EXPERIMENTAL EVALUATION OF VARIOUS RIGIDITY MODELS.
by J. F. Kenaey, J. Gauger, M. A. Shea, and D. F. Smart. May 66, 29p D1-82-0529
Prepared in cooperation with Air Force Cambridge Research Labs., Cambridge, Mass., and Douglas Advanced Research Lab., Huntington Beach, Calif.

Descriptors: (*Cosmic rays, Measurement), Atmospheric sounding, Research planes, Radiation measurement systems, Nuclear models, Particle trajectories, Geophysics, Astrophysics.

Identifiers: Rigidity models.

Atmospheric cosmic-ray fluxes have recently been measured over large portions of the globe on a series of flights of a United States Air Force jet aircraft. The measured fluxes have been plotted as a function of the vertical cutoff rigidity for several different models. The rigorous trajectory calculations of Shea et al. (AFCRL-65-705 Environmental Res. Paper 141, Sept 1965) give good agreement with the counting rates. The Makino model also orders these data equally well, and therefore must be within a few percent of the value determined by rigorous orbit calculations taken over the portions of the globe covered in this survey. The other models are demonstrably worse, and a discussion of where these models are inadequate is given. Particular attention is paid to the use of the L parameter as a substitute for rigorous integration procedures. It is shown both experimentally and theoretically that the L parameter is not a good demographic parameter for galactic cosmic radiation at the lower latitudes, but should be sufficiently accurate at higher latitudes for most purposes. (Author)

AD-636 108 **Field 4A, 22B**
CFSTI Prices: HC$9.60 MF$0.75
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
HIGH ALTITUDE RESEARCH USING THE V-2 ROCKET.
Rept. for Mar 46-Apr 47.
by L. W. Fraser, and E. H. Siegler. Jul 48, 97p Bumblebee-81
Contract NOrd-7386

Descriptors: (*Atmospheric sounding, *Sounding rockets), (*Upper atmosphere, Atmospheric sounding), High altitude, Probes, Cosmic rays, Solar spectroscopy, Aerial photography, Telemeter systems, Data processing systems, Meteorological instruments.

Identifiers: V-2 (Missile), Bumblebee project.

Contents: The V-2 as a research vehicle: Physical characteristics of the rocket; Modification of the Rocket for Scientific Use; Tracking and Reduction of Ballistic Data; Power for V-2 Experiments; Telemetering; Data Recording and Recovery. Cosmic ray studies: Preliminary cosmic ray experiments; equipment and circuits for V-2 cosmic ray experiments; review of results of cosmic ray experiments; cosmic ray film experiment; cosmic ray altitude meters. Solar spectra obtained at high altitude: The APL Spectrograph; Yerkes Observatory Spectrograph. High altitude photography of the earth. Miscellaneous V-2 experiments: Angular motion of the V-2 during flight; photocell orientor; gyro systems; earth camera; artificial meteor and smoke puff experiments; biological experiment.

AD-636 138 **Field 4A, 20I**
CFSTI Price: MF$0.75
Environmental Sciences Services Administration, Boulder, Colo. Inst. of Telecommunication Sciences/Aeronomy.
HYDROMAGNETIC WAVE PROPAGATION NEAR 1c/s IN THE UPPER ATMOSPHERE AND THE PROPERTIES AND INTERPRETATION OF Pc 1 MICROPULSATIONS.
Technical note.
by John A. Dawson. 30 Jun 66, 71p
NBS-TN-342

Descriptors: (*Magnetohydrodynamics, *Upper atmosphere), Propagation, Ultralow frequency, Plasma physics, Geophysics.

PART I: Dispersion and polarization relations are developed from basic considerations for a hydromagnetic wave at about 1 c/s propagating in a cold uniform plasma. The treatment is then extended to include the effects of ion-electron collisions. It is shown that magnetosphere for heights between 10,000 and 50,000 km (2.6 to 8.8 earth radii). At lower elevations the plasma must be considered as nonuniform. Above 50,000 km the small amplitude assumption is invalid. Finally the theory is extended to include the effects of a multicomponent plasma. PART II: A reasonable hydromagnetic model for the propagation of pc 1 micropulsations is one in which Alfven (left-hand) waves travel along field lines to reach the earth's surface at auroral latitudes and then propagate equatorward is modified Alfven (right-hand) waves just above the ionosphere. The isotropic right-hand wave is constrained to a duct between 400 and 2000 km above the earth by refractive processes. It is shown how many of the observed properties of pc 1's can be related to such a model. Mechanisms for the generation of pc 1's are also discussed and it is concluded that particle instabilities are the most likely source. (Author)

AD-636 183 **Field 4A, 7D, 20F**
CFSTI Prices: HC$7.60 MF$0.75
Geophysics Corp. of America, Bedford, Mass.
CHEMICAL RELEASE STUDIES VII: OPTICAL PROPERTIES OF RESONANCE CLOUDS WITH DIFFUSION, FOR VARIOUS INITIAL RELEASE GEOMETRIES.
Technical rept.
by J. Pressman, F. F. Marmo, and H. K. Brown.

Jan 61, 79p GCA-TR-61-4-A
Contract AF 19 (604)-7269
AFCRL-207

Descriptors: (*Atmospheric sounding, Chemical reactions), Chemical projectiles, Ejection, Sounding rockets, Chemicals, Clouds, Upper atmosphere, Optical analysis.

Identifiers: Chemical release, Resonance clouds.

This technical report deals with an initial attempt at the isophote analyses appropriate for several chosen models. These models correspond to several different physical cases encountered in upper atmospheric releases. Appropriate examples are given and suitable graphs are generated for illustration of the cases of resonance clouds with diffusion for various initial release geometries. (Author)

AD-636 255 **Field 4A**
CFSTI Prices: HC$1.00 MF$0.50
Uppsala Univ. (Sweden). Inst. of High Tension Research.
RESEARCHES OF WHISTLER PHENOMENA.
Final rept. 1 Apr 63-30 Apr 66.
by Harald Norinder. 30 Apr 66, 9p
Contract AF 61 (052)-687
AFCRL-66-493

Descriptors: (*Whistlers, Scientific research), Meteorological phenomena, Atmospherics, Sweden.

Analysis was carried out of simultaneously occurring whistlers at three adjacent stations in Sweden at 55, 57, 58 degrees geomagnetic latitudes. Investigations were made to prove the existence of echoes from unusual whistlers. (Author)

N66-14634 **Field 4A**
CFSTI Prices: HC$1.00 MF$0.50
New York Univ., N. Y. Dept. of Chemistry.
THEORETICAL STUDY OF ATOMIC AND MOLECULAR GASES AND THEIR REACTIONS IN THE UPPER ATMOSPHERE.
Summary rept. 1 May-31 Oct 65.
by R. C. Sahni. 1965, 15p
Grant NsG-76-60
NASA-CR-69109

Descriptors: *Hartree-Fock calculation, *Wave equation, *Diatomic molecule, *Energy level.

For abstract, see T 66 17.

N66-14637 **Field 4A**
CFSTI Prices: HC$4.00 MF$1.00
California Univ., Berkeley. Space Sciences Lab.
THE GENERATION OF ELECTRON CYCLOTRON WAVES IN THE MAGNETOSPHERE AND THE TURBULENCE DIFFUSION OF OUTER BELT ELECTRONS.
by R. I. Miller. 20 Aug 65, 136p
Grant NsG-243
NASA-CR-69004

Descriptors: *Cyclotron radiation, *Magnetosphere, *Outer radiation belt, *Turbulent diffusion, *Electron radiation, *Trapped radiation.

N66-15108 **Field 4A**
CFSTI Prices: HC$3.00 MF$0.50
Michigan Univ., Ann Arbor. Electron Physics Lab.
THERMAL RADIATION FROM THE IONOSPHERE.
Technical rept.
by H. C. Hsieh. Apr 65, 58p TR-84
Contract NSG-696
NASA-CR-69190

Descriptors: *Charged particle, *Ionospheric noise, *Particle motion, *Radiation source, *Thermal radiation.

N66-15438 **Field 4A**
CFSTI Prices: HC$3.00 MF$0.75
Pennsylvania State Univ., University Park. Ionosphere Research Lab.
VARIATIONS IN THE TOTAL ELECTRON CONTENT OF THE IONOSPHERE AT MID-LATITUDES DURING QUIET SUN CONDITIONS.
by S. L. Solomon. 30 Nov 65, 76p Scientific-256
Grant NsG-114-61
NASA-CR-69389

Descriptors: *Beacon satellite, *Ionospheric electron density, *Faraday rotation, *Signal transmission.

N66-15627 **Field 4A**
CFSTI Prices: HC$1.00 MF$0.50
Chicago Univ., Ill. Dept. of Geophysical Sciences.
DYNAMICAL HEATING OF THE UPPER ATMOSPHERE.
by C. O. Hines. 1964, 25p
Grant NsG-467
NASA-CR-69496

Descriptors: *Energy absorption, *Gravity wave, *Heat transfer, *Ionospheric heating.

N66-15679 **Field 4A, 4B**
CFSTI Prices: HC$1.00 MF$0.50
Radio Propagation Unit, National Physical Lab., New Delhi (India).
STUDY OF F-LAYER EFFECTS WITH DOPPLER FADING TECHNIQUE.
Interim progress rept. Apr 64 - 16 Aug 65.
by A. P. Mitra, A. K. Saha, and C. V. Subrahmaniam. 1965, 25p

Descriptors: *Doppler effect, *F layer, *Radio noise, *Solar flare, *Sudden ionospheric disturbance (Sid).

N66-15880 **Field 4A, 4B**
CFSTI Prices: HC$4.00 MF$1.00
Defence Research Telecommunications Establishment, Ottawa (Ontario).
ALOUETTE I IONOSPHERIC DATA (ALOSYN), 1-15 NOVEMBER 1962.
30 Jun 65, 159p

Descriptors: *Alouette I satellite, *Ionospheric sounding.

N66-15881 **Field 4A, 4B**
CFSTI Prices: HC$4.00 MF$1.00
Defence Research Telecommunications Establishment, Ottawa (Ontario).
ALOUETTE I IONOSPHERIC DATA (ALOSYN), 16-30 NOVEMBER 1962.
30 Jun 65, 147p

Descriptors: *Alouette I satellite, *Ionospheric sounding.

N66-17244 **Field 4A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
GEOMAGNETIC FIELD LINE DATA FOR THE NOVEMBER 12, 1966 TOTAL SOLAR ECLIPSE.
by J. G. Roederer. Dec 65, 13p NASA-TM-X-55412, X-640-65-512

Descriptors: *Geomagnetic field, *Table, *Solar eclipse.

N66-17252 **Field 4A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
MODELS OF THE EARTH'S MAGNETIC FIELD.
by J. C. Cain. 1 Oct 65, 35p NASA-TM-X-55379, X-612-65-400
Presented at the Advanced Study Inst., Bergen, Aug 16, 1965.

Descriptors: *Geomagnetic field, *Magnetometer, *Earth core, *Mathematical model.

N66-17257 **Field 4A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
MAGNETOPLASMA DIFFUSION AT F2 REGION ALTITUDES.
by P. C. Kendall. Oct 65, 21p NASA-TM-X-55384, X-615-65-409

Descriptors: *Diffusion, *F-2 layer, *Ionosphere, *Magnetoplasma.

N66-17263 **Field 4A**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
A NEW LOOK AT THE EARTH_S MAGNETIC FIELD.
by N. F. Ness. Nov 65, 73p NASA-TM-X-55393, X-612-65-447
Presented at the AAAS Meeting Moving Frontiers in Sci., Berkeley, Calif., Dec 26, 1965.

Descriptors: *Magnetosphere, *Geomagnetic field, *Solar wind.

N66-17897 **Field 4A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
ON THE VARIATIONS OF THE THERMOSPHERIC STRUCTURE.
by W. Priester. Mar 66, 20p NASA-TN-D-3167

Descriptors: *Diurnal variation, *Thermosphere, *Atmospheric temperature, *Solar flux.

N66-17899 **Field 4A**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
WIND VELOCITY PROFILES MEASURED BY THE SMOKE-TRAIL METHOD AT THE EASTERN TEST RANGE, 1962.
by R. M. Henry, J. C. Manning, and R. W. Miller. Mar 66, 76p NASA-TN-D-3289

Descriptors: *Velocity profile, *Wind velocity, *Smoke trail.

N66-18089 **Field 4A**
CFSTI Prices: HC$2.00 MF$0.50
Pittsburgh Univ., Pa. Space Research Coordination Center.
A WIND SHEAR MECHANISM FOR PRODUCING SPORADICE BY CONCENTRATING MINOR METEORIC IONS.
by T. M. Donahue. 24 Jan 66, 31p SRRC-27
Contract NASr-179
NASA-CR-70525

Descriptors: *Ion recombination, *Meteoritic ionization, *Ion concentration, *Sporadic E layer, *Wind shear.

N66-18145 **Field 4A**
CFSTI Prices: HC$2.00 MF$0.50
Centre National de Recherches de L Espace, Brussels (Belgium).
IONOSPHERIC PROCESSES AND NITRIC OXIDE.
by M. Nicolet. Oct 64, 31p

Descriptors: *E layer, *D layer, *Ionic reaction, *Molecular interaction, *Nitric oxide.

PB-170 369 **Field 4A**
CFSTI Prices: HC$4.00 MF$0.50
Maryland Univ., College Park. Dept. of Physics and Astronomy.

THE MEASUREMENT OF THE VERTICAL DISTRIBUTION OF OZONE IN THE TERRESTRIAL ATMOSPHERE FROM A SATELLITE.
Progress rept.
by Richard T. Bettinger, and Jerome R. Bohse.
Mar 66, 55p Technical rept. TR-546
Grant WBG-4-FY-64

Descriptors: (*Ozone, Measurement), (*Atmosphere, Ozone), Meteorological satellites, Albedo (Astronomy), Ultraviolet radiation, Meteorological balloons, Atmospheric sounding.

The measurement of the vertical distribution of ozone in the terrestrial atmosphere from a satellite is best performed from an analysis of the albedo in the UV in the region between 0.25mu and 0.32mu. The technique probably has application only to altitudes above 25 km due to limitations introduced by the resultying integral equation, by multiple scattering effects and by cloud and surface albedo. A meaningful experiment requires a high degree of experimental accuracy, at least 1 % and preferably much better. This places severe limitations on the detector and data analysis techniques which may be employed. A balloon program is presently underway, designed to investigate various aspects of this general problem. In particular, several experimental techniques will be tested along with direct measurements of the ozone which may then be compared with the UV albedo measured with the spectroscopic equipment. In addition, it is planned to obtain direct spectral measurements of the ground and cloud albedo along with a cross correlation of results obtained at balloon and aircraft altitudes. (Author)

PB-170 417 **Field 4A, 4B**
CFSTI Prices: HC$1.50 MF$0.50
Florida State Univ., Tallahassee. Dept. of Meteorology.
A NEW CONCEPT OF AVAILABLE POTENTIAL ENERGY.
Final rept.
by Richard L. Pfeffer. 1965, 39p Rept. no. 66-1
Grant WBG-45

Descriptors: (*Atmosphere, Potential energy), (*Potential energy, Atmosphere), Atmospheric motion, Kinetic energy, Atmospheric temperature, Earth (Planet), Rotation.

The report consists of two parts. The first is a paper presented at the International Symposium on the Dynamics of Large-Scale Processes in the Atmosphere in Moscow in June 1965 describing a new concept of available potential energy and outlining a combined theoretical, experimental and observational approach to certain aspects of the problem of planetary-scale atmospheric fluctuations. The second part is an appendix containing additional temperature distributions observed at the beginning and end of several marked declines of available potential energy in the atmosphere. (Author)

PB-170 489 **Field 4A**
CFSTI Prices: HC$6.00 MF$2.00
National Center for Atmospheric Research, Boulder, Colo.
TWO YEARS OF REGULAR OZONE SOUNDINGS OVER BOULDER, COLORADO.
by Hans Ulrich Dutsch. Jan 66, 444p NCAR-TN-10
Supported in part by NSF.

Descriptors: (*Ozone, Atmospheric sounding), (*Atmospheric sounding, Ozone), Meteorological balloons, Electrochemical cells, Atmospheric motion, Periodic variations, Stratosphere, Colorado.

The vertical ozone distribution over Boulder, Colorado, was monitored routinely by the National Center for Atmospheric Research (NCAR) since August 1963. Measurements were made with balloon-borne Brewer-Mast electrochemical sondes. The report presents data from the first two years, which comprised about 350 soundings. Mean values computed from this material are discussed in relation to the general circulation. Differences between the two years of observation may be connected with the 26-month cycle of the tropical stratosphere. (Author)

PB-170 664 **Field 4A**
CFSTI Prices: HC$6.00 MF$0.50
Weather Bureau, Washington, D. C. Office of Hydrology.
INFRARED RADIATION FROM AIR TO UNDERLYING SURFACE.
Office of Hydrology rept.
by Vance A. Myers. May 66, 39p WBTN-44-HYDRO-1

Descriptors: (*Infrared radiation, Measurement), Air, Transport properties, Surface properties, Earth (Planet).

This paper, based on Elsasser's 1960 monograph, develops a computer method for calculating the flux of infrared radiation from the atmosphere, with or without clouds, to the earth's surface. The intended application is to computation of energy available to melt snow and evaporate water in hydrologic analysis. Radiosonde data provide the necessary measure of atmospheric temperature and humidity. (Author)

AD-435 973 **See Field 20N**

AD-441 576 **See Field 20N**

AD-442 626 **See Field 20N**

AD-453 476 **See Field 12A**

AD-635 782 **See Field 14D**

AD-635 860 **See Field 20N**

AD-635 974 **See Field 3B**

AD-636 034 **See Field 7E**

AD-636 036 **See Field 7E**

AD-636 182 **See Field 20I**

AD-636 254 **See Field 4B**

4B. METEOROLOGY

AD-635 546 **Field 4B, 20D**
CFSTI Prices: HC$3.00 MF$1.00
Massachusetts Inst. of Tech., Cambridge. Dept. of Meteorology.
STUDIES OF THE ATMOSPHERIC GENERAL CIRCULATION, V.
Final rept., 1 Apr 63-31 Mar 66.
by Victor P. Starr. 31 Mar 66, 184p
Contract AF19 (628)-2408
Proj. AF-8628
Task 862809
AFCRL-66-279
Rept. on Planetary Circulations Proj.

Descriptors: (*Atmospheric motion, Theory), Meteorological parameters, Fluid mechanics, Thermodynamics, Geophysics.

The significant results are presented in the form of reprints of scientific articles written by project members during the contract period. The first general aim of the work has been to describe the mode of operation of the earth's planetary atmosphere in regard to the main variables involved, such as wind, temperature, etc. through the study of extensive observational material in the light of the fundamental conservation equations, of fluid mechanics, and of thermodynamics. Efforts were also made to discuss these results through deductive theoretical studies. Finally, several studies were undertaken to explore other cosmic fluid systems through the application of experience gained in studying the earth's atmosphere. (Author)

AD-635 588 **Field 4B, 2D**
CFSTI Prices: HC$6.00 MF$1.50
California Univ., Davis.
INVESTIGATION OF ENERGY, MOMENTUM AND MASS TRANSFERS NEAR THE GROUND.
Final rept. for 1965.
by F. A. Brooks, and W. O. Pruitt. Jun 66, 248p
Grant DA-AMC-28-043-65-G12
Task DA-1V0-14501-B53A-08

Descriptors: (*Micrometeorology, *Evapotranspiration), Fluid mechanics, Meteorological parameters, Thermodynamics, Agriculture.

Half-hourly averages of field measurements of flux rates of heat and evaporation are reported in 1963, 1964, 1965. Selected examples of momentum flux and the three corresponding profiles of airspeed, temperature, and moisture are included. Crop plantings around the flat, 5-hectare site are described in detail, and the meteorological conditions are thoroughly documented. The observations reveal a wide range in the ratios of eddy diffusivities and rather high magnitudes for the Karman constant (about 0.45 - 0.55). Various aerodynamic, energy balance and other evaporation equations were checked against evapotranspiration data from the 6.1 meter weighing lysimeter. Results show the need for very significant diabatic correction of the aerodynamic expressions at low wind speeds. Statistical treatment removing the cyclic variation from the record of the shear-stress meter show that this 50-ton float follows the varying drag of wind gusts well within one minute. The revised profile formula (log law and power law) has been found to fit observations of airspeed and temperature about 30 per cent better than the conventional Monin-Obukhov formula. The illogical averaging of friction-eddy forced convection with buoyant-parcel natural convection is discussed and a tentative lower airspeed limit of 2 m/sec at a 2-meter height is proposed for application of eddy-transfer formulas. Several concepts are discussed of flow regimes near the ground and detailed descriptions of instrumentation and calibration are included. (Author)

AD-635 589 **Field 4B, 16B, 19D**
CFSTI Prices: HC$1.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range N. Mex.
HONEST JOHN MISSILE NO. 40, ROUND NO. 523 RML (8 JUNE 1966).
Meteorological data rept.
Jul 66, 16p DR-42
Task 1V650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Honest John, Ballistic meteorology.

Meteorological data gathered for the launching of Honest John, Missile Number 40, Round No. 523 RML, are presented in tabular form. (Author)

AD-635 590 **Field 4B, 16B, 19D**
CFSTI Prices: HC$6.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, New Mex.
HONEST JOHN MISSILE NO. 43, ROUND NO. 524 RML (21 JUNE 1966).
Meteorological data rept.
Jul 66, 22p DR-46
Proj. DA-1V650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajec-

tories, Impact prediction, Rocket research, Launching Test facilities, New Mexico.

Identifiers: Honest John, Ballistic meteorology.

Meteorological data gathered for the launching of Honest John, Missile Number 43, Round No. 524 RML, are presented in tabular form. (Author)

AD-635 863 **Field 4B, 22B**
CFSTI Prices: HC$5.00 MF$1.25
Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
METEOROLOGICAL ROCKET NETWORK FIRINGS. OCTOBER 1965 FIRINGS.
Data rept.
May 66, 197p IRIG-109-62-Vol-50
See also AD-634 381.

Descriptors: (*Sounding rockets, *Atmospheric sounding), Meteorological parameters, Tables, Meteorology, Climatology.

The Meteorological Rocket Network Data Report contains the wind and temperature measurements from all available Network firings along with computed values for pressure, density, and speed of sound. It also includes the radiosonde observations nearest the time of firing. Release time of the radiosonde should be within plus or minus 6 hours of the time of firing. However, exceptions up to plus or minus 12 hours are made, particularly in tropical regions. Since only those firings which yield significant data are of interest here, the report does not include unsuccessful firings. Meteorological Rocket Network Stations which have contributed data are listed in the index.

AD-635 919 **Field 4B, 20D**
CFSTI Prices: HC$5.00 MF$1.00
Colorado State Univ., Fort Collins. Fluid Dynamics and Diffusion Lab.
TURBULENT DIFFUSION IN A SIMULATED VEGETATIVE COVER.
Technical rept.
by Motoaki Yano. May 66, 166p CER66MY25
Grant DA-AMC-28-043-65-G20

Descriptors: (*Atmospheric motion, *Diffusion), Terrain models, Simulation, Wind tunnels, Roughness, Wake, Surfaces, Factor analysis, Shear stresses, Plants (Botany).

The study of the turbulent diffusion over a rough surface in the wind tunnel was utilized with the concept of momentum defect super-position in the wakes of an array of roughness elements. Based on this concept, the characteristics of each factor of turbulent diffusion are analyzed and the results are confirmed experimentally. From agreement between theory and experiment, the concept, the turbulent shear flow consists of the combination of the individual wake flows, is confirmed. (Author)

AD-636 254 **Field 4B, 4A**
CFSTI Prices: HC$3.00 MF$0.75
California Univ., Los Angeles. Dept. of Meteorology.
ON THE PARTITIONING OF THE BAROCLINIC VERTICAL MOTIONS IN A DEVELOPING WAVE CYCLONE.
by T. N. Krishnamurti, Julia Nogues, and Dave Baumhefner. May 66, 61p Scientific-1
Contract AF 19 (628)-4777
Proj. AF-6698
Task 669802
AFCRL-66-419

Descriptors: (*Air mass analysis, *Cyclones), Atmospheric motion, Convection, Mathematical models.

The simple quasi-geostrophic or a more general W-equation of a balanced model can be used in a unique manner to partition the vertical velocities. A study of such a partitioning determines the contributions by several baroclinic processes that are somewhat hard to see from a mere visual examination of the pressure and thermal fields on synoptic weather maps. The results of the quasi-geostrophic partitioning show that the thermal advection and its contribution are quite large even at the open wave stage. This is contrary to Petterssen's (1956) views that upper vorticity advection initiates the development of an open wave. The results are in agreement with the linear stability analysis of Phillips (1954) and Ogura (1956). The results of the multi-level baroclinic balanced model determines the importance of some of the terms that are absent in the quasi-geostrophic theory and that are rather large during the life history of a wave cyclone. Large magnitudes to the baroclini vertical motions are contributed by a part of the divergence term in the vorticity equation which is neglected in the quasi-geostrophic models. Contributions by the deformation terms of the balanced stream function are also large and contribute significantly to the storm dynamics during its growth. A multi-level diagnostic balance model is demonstrated as a powerful tool for studying three dimensional details of the non-geostrophic behavior of the atmosphere during various stages of a storm development. (Author)

AD-636 256 **Field 4B**
CFSTI Prices: HC$2.00 MF$0.50
Earth Sciences Div., Army Natick Labs.
YUMA WINTER MICROCLIMATE.
Technical rept.
by Howard L. Ohman, and Richard L. Pratt. Jun 66, 43p ES-24
Proj. DA-1V025001A129
USA-NLABS-TR-66-7-ES
When original supply is exhausted copies will be in black and white.

Descriptors: (*Climatology, Arizona), (*Micrometeorology, Arizona), (*Deserts, Climatology), Meteorological parameters, Diurnal variations, Army research, Test facilities.

This study consists of an analysis of winter temperatures at and near the ground and wind velocities at standard heights, at three sites within Yuma Proving Ground. Two of the sites were selected for their representativeness of surface types characterizing the desert basins of southwestern United States. The third site was selected to represent the many low rocky mountain areas of the desert. The study develops information on the nature of diurnal temperature fluctuations, based on hourly records of temperature of January and February 1957, at ten levels ranging from 25 centimeters below the ground to 200 centimeters above the ground surface. In addition, hourly records of wind speed and direction at the standard shelter height were kept and analyzed.

N66-14627 **Field 4B**
CFSTI Prices: HC$1.00 MF$0.50
South Dakota School of Mines and Technology, Rapid City. Inst. of Atmospheric Sciences.
THE FLASHING BEHAVIOR OF THUNDERSTORMS.
by A. S. Dennis. 1965, 10p
Contract NASR-49
NASA-CR-69112
Prepared for presentation at Natl. Meeting of Am. Meteorol. Soc. on Cloud Phys and Severe Local Storms (244th), Reno, Nevada, 18-22 Oct 65.

Descriptors: *Lightning, *Flash, *Statistical analysis, *Thunderstorm.

For abstract, see T 66 17.

N66-18082 **Field 4B**
CFSTI Prices: HC$1.00 MF$0.50
Department of Transport, Toronto (Ontario). Meteorological Branch.
NUMERICAL COMPUTATION OF THE GRADIENT WIND IN THE HIGH TROPOSPHERE.
by D. L. Holyoke. 30 Jun 65, 23p CIR-4263, TEC-575

Descriptors: *Wind measurement, *Numerical integration, *Troposphere.

PB-169 924 **Field 4B, 13M**
CFSTI Prices: HC$4.00 MF$0.75
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Building Research.
SOLAR POSITION AND RADIATION TABLES FOR DARWIN (LATITUDE 12 1/2 DEGREE S.).
by J. W. Spencer. 1965, 79p Technical paper TP-19
See also PB-169 923.

Descriptors: (*Sun, Astronomical geodesics), (*Solar radiation, Mathematical prediction), (*Australia, Solar radiation), Buildings, Design, Civil engineering.

PB-169 925 **Field 4B, 13M**
CFSTI Prices: HC$1.50 MF$0.75
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Building Research.
SOLAR POSITION AND RADIATION TABLES FOR ADELAIDE (LATITUDE 35 DEGREES S.).
by J. W. Spencer. 1965, 79p Technical paper TP-18
See also AD-169 923.

Descriptors: (*Sun, Astronomical geodesics), (*Solar radiation, Mathematical prediction), (*Australia, Solar radiation), Buildings, Design, Civil engineering.

PB-169 926 **Field 4B, 13M**
CFSTI Prices: HC$4.00 MF$0.75
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Div. of Building Research.
SOLAR POSITION AND RADIATION TABLES FOR CANBERRA (LATITUDE 35 DEGREES S.).
by J. W. Spencer. 1965, 79p Technical paper TP-16
See also AD-169 923.

Descriptors: (*Sun, Astronomical geodesics), (*Solar radiation, Mathematical prediction), (*Australia, Solar radiation), Buildings, Design, Civil engineering.

PB-170 370 **Field 4B**
CFSTI Prices: HC$3.00 MF$0.50
Satellite and Mesometeorology Research Project, Univ. of Chicago, Ill.
A MODEL OF TYPHOONS ACCOMPANIED BY INNER AND OUTER RAINBANDS.
by Tetsuya Fujita, Tatsuo Izawa, Kazuo Watanabe, and Ichiro Imai. Mar 66, 34p SMRP-RP-60
Grants Cwb-WBG-34, NSG-GF-179
Supported in part by grants JSPS-GEO-4, Cwb-WBG-70. Prepared in cooperation with Meteorological Research Inst., Tokyo (Japan).

Descriptors: (*Tropical cyclones, Mathematical models), (*Mathematical models, Tropical cyclones), Meteorological parameters, Meteorological satellites.

Identifiers: TIROS.

Both hurricanes and typhoons are relatively circular storms with their winds at high levels blowing mostly outward. Assuming that the outflow is characterized by central motion under the influence of the pressure-gradient forces pointing toward the storm center, the absolute angular momentum of the outflow winds and radar echoes were computed. The upward motion inside these echoes plays an important role in the upward transport of the low-level angular momentum. Detailed analysis made by using satellite, radar, and aerological data revealed that the absolute angular momentum of radar echoes near the eye wall is almost one order of magnitude smaller than that of the echoes in the outer rainbands. This fact leads to a suspicion that the radial distribution of the verti-

cal velocity inside a storm would significantly alter the pattern of the outflow winds near the storm top. A numerical model, including the radial distribution of the vertical velocity, was thus established. Computations indicated that the vertical transport of momentum by outer rainbands alters the outflow wind pattern, resulting in the formation of a ring of high-cloud-free region which separates the inner cirrus shield from the outer cirrus decks. This ring sometimes appears as a clear area on a satellite photograph. (Author)

PB-170 377 **Field 4B**
CFSTI Prices: HC$1.50 MF$1.00
National Engineering Science Co., Houston, Tex.
A CATALOGUE OF WEATHER SATELLITE OBSERVED WEATHER SYSTEMS.
Final rept.
by W. H. Portig, F. A. Mitchell, D. R. Veazey, S. B. Magie, and A. C. Stella. Aug 65, 89p SN-190-1
Contract Cwb-10853

Descriptors: (*Catalogs, Meteorological parameters), (*Meteorological parameters, Meteorological satellites), (*Mexico Gulf, Meteorological parameters), Clouds.

Identifiers: TIROS.

This catalogue of Weather Satellite Observed Weather Systems was conceived as a method of studying meteorological and cloud systems over the Gulf of Mexico and its surrounding areas. Seventy-six satellite cases, each viewing all or part of the Gulf region, have been selected for comparison with the synoptic surface and 500 mb charts which correspond closely in time to the pass. The seventy-six cases were chosen from all TIROS IV, V, VI, VII and VIII passes through 29 September 1964. They are listed in chronological order by months, January through December. (Author)

PB-170 392 **Field 4B**
CFSTI Prices: HC$1.50 MF$0.50
Control Data Corp., Minneapolis, Minn. Research Div.
NETWORK INFLUENCE ON WIND INTERPOLATION IN THE TROPICS.
Final rept.
by A. D. Belmont, L. W. Engberg, and W. C. C. Shen. 15 Jan 66, 39p
Contract Cwb-11164

Descriptors: (*Meteorological data, Tropical regions), (*Tropical regions, Meteorological data), Wind.

To find the effect of network density on tropical map analysis, an historical set of surface wind data for ten days, for the area 25 degrees N to 25 degrees S, was used to interpolate values at a regular 2.5 degrees grid. From this reference map for each day, the 2.5 degrees grids were successively degraded to 10 degrees, 12.5 degrees, 15 degrees and 20 degrees spacing, then restored to 2.5 degrees using a bivariate interpolation method. The differences of restored from the original wind at each grid point were then examined. It was found that most of the total error in wind speed occurred from 2.5 to 5 degrees grids, and from 10 to 15 degrees for wind direction error. The final increase from 15 to 20 degrees always yielded the least error increment. It is suggested the analysis also be applied to upper-air data and to a larger data sample. An objective streamline analysis computer program for a Control Data 3600 was developed during the study, which represents all types of singular points. (Author)

PB-170 410 **Field 4B**
CFSTI Prices: HC$3.00 MF$0.50
National Meteorological Center, Weather Bureau, Washington, D. C.
SUMMARY OF VERIFICATION OF NUMERICAL OPERATIONAL TROPICAL CYCLONE FORECAST TRACKS FOR 1965.
Technical memo.
by Lloyd W. Vanderman. Mar 66, 9p WBTN-37-NMC-36

Descriptors: (*Tropical cyclones, Weather forecasting), (*Weather forecasting, Mathematical prediction), Numerical analysis.

PB-170 412 **Field 4B**
CFSTI Prices: HC$3.00 MF$0.50
Colorado State Univ., Fort Collins.
CHARACTERISTICS OF SILVER IODIDE ICE NUCLEI ORIGINATING FROM ANHYDROUS AMMONIA - SILVER IODIDE COMPLEXES. PART II. THERMAL SYSTEMS.
Technical paper,
by R. L. Steele, and F. W. Sciacca. Apr 66, 14p TP-66-3, TP-78
Grant NSF-GP-1662
See also PB-169 608.

Descriptors: (*Artificial precipitation, Nucleation), (*Ice, Nucleation), (*Silver compounds, Iodides), (*Ammonia, Artificial precipitation), Combustion, Complex compounds, Evaporation, Effectiveness, Dissociation, Temperature, Acetones, Amines.

Identifiers: Silver iodide.

Thermal processing is accomplished by burning the ammonia in the complex in a supporting flame of No. 1 fuel oil using highly preheated air. The process releases the silver iodide from the complex by rapid evaporation without decomposition of the AgI. Silver iodide particles ranging in diameter 100 to 700A are produced. The influence of various combustion parameters on effectiveness are discussed. It is shown that the stoichiometric ratio is a dominant variable in effectiveness which falls sharply at stoichiometric ratios of greater than 1.15. Dissociation of the AgI and the ammonia were investigated and this was found to be minimal. Effectiveness increases exponentially with temperature and reaches a maximum at about 2750F. The thermal and non-thermal processed AgI are compared using effectiveness data and electron micrographs. The paper closes with a comparison of thermal and non-thermal AgI-NH3 complexes and AgI-KI-Acetone systems. Also mentioned is an isopropylamine-AgI system which has many similarities to the anhydrous ammonia system but is much simpler. Both systems show markedly better effectiveness than the AgI-KI-Acetone systems, especially at the higher temperatures.

PB-170 415 **Field 4B**
CFSTI Prices: HC$6.00 MF$0.75
Miami Univ., Coral Gables, Fla. Inst. of Marine Science.
CHARACTERISTICS OF THE HURRICANE SEASON IN THE NORTH ATLANTIC OCEAN INCLUDING THE CARIBBEAN SEA AND GULF OF MEXICO.
Final rept.
by Jose Carlos Millas. Apr 66, 73p Rept. nos. 8868-1, ML-66135
Contract Cwb-11179

Descriptors: (*Marine meteorology, Tropical cyclones), (*Tropical cyclones, Marine meteorology), Atlantic Ocean, Mexico Gulf, Caribbean Sea.

PB-170 510 **Field 4B**
CFSTI Prices: HC$1.50 MF$0.75
Aerometric Research, Inc., Goleta, Calif.
INVESTIGATION OF CLOUD-WATER BUDGET OF PACIFIC STORMS.
Final rept.
by Robert D. Elliot, Einar L. Hovind, and John W. Flavin Jr. Dec 62, 60p
Contract Cc-104

Descriptors: (*Marine meteorology, Pacific Ocean), Meteorological data.

The analysis of one Pacific winter cyclone presented in this report has revealed several interesting findings with regard to the mesoscale organization of the storm and its interaction with the storm mean motion. The techniques employed in rawinsonde and aircraft data analysis have shown it feasible to compute the basic scales of the vertical motion within the storm system. These appear to be in good agreement with the corresponding components of the precipitation distribution. Of particular interest are the occurrences of organized convection bands within those storm systems which have been analyzed to date. These bands add a new feature to the conventional cyclone model. They are part of the detailed picture of the storm structure which has emerged from our mesoscale analysis of conventional and special meteorological data collected within the sampling area. The originally planned water budget analysis of a statistically valid sample of winter storms can now proceed with assurance that proper consideration will be given to the important role played by these mesoscale features. (Author)

PB-170 584 **Field 4B**
CFSTI Prices: HC$6.00 MF$0.50
National Meteorological Center, Weather Bureau, Washington, D. C.
TROPOSPHERIC HEATING AND COOLING FOR SELECTED DAYS AND LOCATIONS OVER THE UNITED STATES DURING WINTER 1960 AND SPRING 1962.
by Philip F. Clapp, and Francis J. Winninghoff. Nov 65, 22p TN-22-NMC-34

Descriptors: (*Climatology, Atmospheric temperature), (*Atmospheric temperature, Climatology), Troposphere, Heating, Cooling, Tables, Meteorological parameters.

PB-170 694 **Field 4B, 1B**
CFSTI Prices: HC$3.00 MF$1.00
National Aviation Weather Systems Study, Washington, D. C.
FINAL REPORT, JUNE 1963-APRIL 1964.
by Walter A. Hahn. 30 Jun 64, 165p

Descriptors: (*All-weather aviation, State-of-the-art studies), (*Weather forecasting, All-weather aviation), Aviation safety, Weather communications, Systems engineering, Cost effectiveness, Research program administration.

There exists an interface between the Federal Aviation Agency's (FAA) aeronautical service system and the U. S. Weather Bureau's (USWB) aviation weather service system. The National Aviation Weather Systems Study (NAVWESS) was organized to study this interface and optimize the utilization of joint resources while maintaining or improving present services and safety levels. Common functions, facilities and products are highlighted by a description of existing aeronautical and aviation weather systems. Analysis of the existing system pointed out problem areas and produced recommendations that would alleviate them. NAVWESS Working Group found that aviation requirements and criteria for weather observations and services should be re-evaluated by the FAA, USWB, CAB and representatives from user groups. Also, proposals and recommendations were made for utilizing total resources of the FAA and USWB in FSS consolidation, FSS/WBAS combined services, joint maintenance, and joint construction. These recommendations represent an estimated net savings to the government of about $3 million per year and with other proposals, such as integrated system design, improved FAA/USWB coordination mechanism and updated and more extensive PIREP system, would produce a more efficient joint agency service to the aviation community. A forecast of technological and operational changes occurring annually through 1970 is included to give an insight on the most likely paths the FAA and USWB will travel to provide efficient aeronautical and aviation weather service in the conterminous United States. Included also is a description of the conduct of the NAVWESS

effort and how its unique characteristics proved successful in integrating FAA/USWB efforts in a finite area. (Author)

PB-170 695 **Field 4B**
CFSTI Prices: HC$1.50 MF$1.00
Radio Corp. of America, Princeton, N. J. Defense Electronic Products.
WORLD WEATHER WATCH: COST/PERFORMANCE ANALYSIS STUDY.
Final rept.
15 May 66, 167p
Contract Cwb-11014
See also PB-169 313.

Descriptors: (*Weather forecasting, Cost effectivess), (*Weather stations, Analysis), (*Weather communications, Analysis), Systems engineering, Performance (Engineering), Radiosondes, Buoys, Sounding rockets, Aircraft, Ships (Nonmilitary), Meteorological balloons, Meteorological satellites, Communication equipment.

Identifiers: World Weather System.

The results of the study indicate that evolutionary implementation of an operational WWW configuration employing new technology is feasible by 1975. Such a system would serve to reduce annual costs while fully providing the desired coverage. The Phase I First Stream WWW would utilize conventional communications entirely, with some augmentation of ocean-area coverage by moving ships of opportunity carrying observer crews to make surface and upper-air measurements. During this time, the parallel Second Stream Technology Development effort will continue research and development of satellite communications techniques and new observation platforms and sensors, such as horizontal-sounding balloons, buoys, and satellite sensors. It is recommended that at the earliest possible time, the First Stream global communications subsystem be converted to a satellite system for both data collection and product dissemination. It is recommended that emphasis be placed on the development of instruments (perhaps similar in nature to the temperature profile sensing devices that will become operational before 1975) for remotely sensing atmospheric state parameters from orbiting satellites. It is also recommended that WWW systems studies and operational analyses be continued in conjunction with changing and updating of system requirements. (Author)

PB-170 699 **Field 4B**
CFSTI Prices: HC$1.50 MF$0.75
Aerometric Research, Inc., Goleta, Calif.
INVESTIGATION OF CLOUD-WATER BUDGET OF PACIFIC STORMS.
Interim rept. no. 2.
by Robert D. Elliott, Einar L. Hovind, and John W. Flavin Jr. Dec 61, 105p
Contract NSF-C-104

Descriptors: (*Storms, Pacific Ocean), (*Marine meteorology, California), Air mass analysis, Meteorological parameters, Water, Clouds.

A detailed study has been made of a storm system of January 25-26, 1961. This storm, considered typical of the warm front type occlusions entering Southern California, showed the following features: There was no evidence of well-defined air masses separated by distinct frontal surfaces. Although a considerable amount of precipitation fell over a 12-hour period, the distribution did not suggest a gentle frontal air mass lifting. The study, instead, shows that the storm was characterized by: A pattern of strong vertical motion, condensation, and precipitation concentrated in narrow regions penetrating the weak frontal surfaces. An equal importance between the evaporations of the cloud water aloft and the precipitation out of the cloud water below. The importance of the heat and momentum transfer by convective-frictional processes in the overall storm mechanism. Furthermore, analysis of liquid-water-content data from several penetrations made of frontal and air mass cloud systems shows that: There is a marked horizontal variability in the liquid-water-content in clouds, indicative of cellular structure with the optimum spacing of the cells between 3,000 and 4,5000 feet. There is a vertical gradient of liquid-water-content within the clouds with maximum values found between 1,000 to 2,000 feet below the cloud tops. Well developed cloud systems with low precipitation rates show the highest liquid-water-content. (Author)

PB-170 743 **Field 4B**
CFSTI Prices: HC$3.00 MF$0.50
Colorado State Univ., Fort Collins.
ON THE MECHANICS AND THERMODYNAMICS OF A LOW-LEVEL WAVE ON THE EASTERLIES.
by Russell Elsberry. May 66, 35p Atmospheric Science paper-101
Contract WBG-61

Descriptors: (*Jet streams (Meteorology), Thermodynamics), Mechanics.

Identifiers: Easterly jet.

In order to gain background on the constraints on hurricane development from waves in the easterlies, a warm-core wave observed in the Caribbean was studied. Data were composited with respect to the wave axis for three days assuming nearly a steady state. The synoptic scale structure and energetics are discussed. The kinetic energy balance indicates an excess of production over the computed dissipation. A heat balance of the system likewise shows an excess heat source. Models of the mesoscale cloud structure required to balance the heat budget under constraint of kinetic energy balance are proposed. (Author)

PB-170 745 **Field 4B, 13B**
CFSTI Prices: HC$6.00 MF$0.50
Weather Bureau, Washington, D. C.
ESTIMATES OF DISPERSION FROM POLLUTANT RELEASES OF A FEW SECONDS TO 8 HOURS IN DURATION.
by David H. Slade. Apr 66, 32p Technical note TN-39
WBTN-ARL-3

Descriptors: (*Air pollution, Diffusion), (*Waste gases, Diffusion), Wind, Meteorological parameters, Climatology, Nomographs, Statistical analysis.

A simple method, based on on-site measurements made with a single wind system, for estimating dosage or concentration values, from point sources of pollution at a specific location. The method is based on diffusion theory and experimental evidence. A number of readily rationalized simplifications were used to develop this system of dispersion specification which is primarily intended for use in constructing dispersion climatologies. A major portion of this paper is reproduced from PB-168 335. The method may be used at any location situated in reasonably regular terrain. It should be used with great care, if at all, in areas typified by large, discrete topographic variations such as marked valleys, mountain peaks, and coastal regions. (Author)

PB-170 757 **Field 4B**
CFSTI Prices: HC$1.50 MF$0.50
Weather Bureau, Washington, D. C.
A THUNDERSTORM 'WARM WAKE' AT MIDLAND, TEXAS. AN UNUSUAL TEMPERATURE FLUCTUATION AT MIDLAND, TEXAS.
Southern Region rept.
by Richard A. Wood, and Young T. Sloan. Jun 66, 14p
WB-TN-42-SR-3

Descriptors: (*Thunderstorms, Texas), Atmospheric temperature, Oscillation, Air mass analysis, Meteorological charts.

A thunderstorm at Midland, Tex. produced a surface temperature rise of about 12F. on May 25, 1963. This condition has been referred to as a 'warm wake.' The synoptic events of the period are presented and discussed. A temperature rise of 14F. in less than an hour was observed at Midland, Texas on the early morning of June 15, 1965. This temperature change appeared to be associated with a small dissipating cumulonimbus cloud. The synoptic situation is discussed and a possible cause of the temperature rise suggested. (Author)

PB-170 841 **Field 4B**
CFSTI Prices: HC$6.00 MF$0.75
Travelers Research Center, Inc., Hartford, Conn.
GENERAL CIRCULATION RESEARCH.
Final rept.
by Barry Saltzman, and M. Sankar-Rao. Mar 66, 104p Rept. no. 7042-214
Contract Cwb-11057

Descriptors: (*Atmospheric motion, Scientific research), Terrain, Thermodynamics, Climatology, Fluid mechanics.

Contents: Continental elevation influence on the stationary harmonics of atmospheric motion; On the influence of the vertical distribution of stationary heat sources and sinks in the atmosphere; On the theory of the mean temperature of the earth's surface; Surface boundary effects on the general circulation and macroclimate: a review of the theory of the quasi-stationary perturbations in the atmosphere.

AD-635 827 **See Field 4A**

AD-635 977 **See Field 4A**

AD-636 050 **See Field 4A**

AD-636 053 **See Field 8J**

N66-15679 **See Field 4A**

N66-15880 **See Field 4A**

N66-15881 **See Field 4A**

PB-170 417 **See Field 4A**

PB-170 476 **See Field 8J**

PB-170 582 **See Field 6C**

PB-170 629 **See Field 8C**

PB-170 756 **See Field 17I**

5A. ADMINISTRATION AND MANAGEMENT

AD-469 624 **Field 5A**
CFSTI Prices: HC$1.10 MF$0.50
RAND Corp., Santa Monica, Calif.
A NEW DIRECTION FOR RESEARCH ON RESEARCH.
by Raoul J. Freeman. Aug 65, 4p P-3212

Descriptors: (*Scientific research, Models (Simulations)), Analysis, Decision making, Research program administration, Statistical analysis, Mathematical models, Management planning.

The report indicates a new direction for research on research in terms of attempts to isolate the individual research decisions and the possible sequences thereof. To accomplish this, case studies, interviews with experimenters, consultation of research diaries, dissection of published research, etc. are suggested. All of this would have to be undertaken in statistically sufficient quantities. It seems fair to ask if it is worthwhile to isolate these basic decision sequences whose existence has yet to be established and whose 'reasonable' finiteness remains an assertion. Present models, however, are not aimed at a substantive understanding of

the innards of the research process and do not seem to focus on repetitive phenomena. What is suggested above is designed to cope with these deficiencies. It is not clear how such decision structures would describe the R and D process and what power of predictability is inherent in them. However, a new orientation is needed if much of anything is to be achieved beyond present capability in research on research. (Author)

AD-469 625 **Field 5A**
CFSTI Prices: HC$1.10 MF$0.50
RAND Corp., Santa Monica, Calif.
R AND D MANAGEMENT RESEARCH.
by Raoul J. Freeman. Aug 65, 9p P-3216

Descriptors: (*Management planning, Research program administration), Analysis, Mathematical models, Stochastic processes, Decision making, Scheduling, Costs.

The paper describes some past quantitative work that has been done in the general area of 'research on R and D management,' and then points toward some directions which might be worthy of future investigation. Most of the work done heretofore has not been based on the decision structure of the research work itself. Reorientation of 'research on R and D management' towards the latter direction is recommended. (Author)

AD-477 017 **Field 5A, 15C**
CFSTI Prices: HC$3.60 MF$0.50
RAND Corp., Santa Monica, Calif.
POLICIES FOR MILITARY RESEARCH AND DEVELOPMENT.
by Thomas K. Glennan Jr. Nov 65, 40p P3253

Descriptors: (*Armed forces research, Research program administration), (*National defense, Research program administration), Weapon systems, Management planning, Scientific research, Military requirements.

The military research and development program must provide the United States with the capability to produce weapons which are needed or may be needed to support the needs of National Security. At any point in time, the total R and D program encompasses efforts to improve existing forces, develop specific new equipment, and explore technologies which may be useful to future forces. More specifically, the objectives of the program can be viewed as: (1) To carry on the development of weapon systems required to meet the current military needs of our armed forces; (2) To expand the technological alternatives available to meet future needs of national security; (3) To provide (along with non-military research) a basis for understanding the implications of technological activities of our enemies; and (4) To provide technological inputs to the planning process of the military services.

AD-635 810 **Field 5A**
CFSTI Prices: HC$3.00 MF$0.75
General Technical Services, Inc., Yeadon, Pa.
ANNOTATED INTERDISCIPLINARY BIBLIOGRAPHY OF THE PHYSICAL SCIENCES.
Rept. no. 2, Jun 65-Jul 66.
by Samuel Z. Cardon. Jul 66, 72p
Contract DA-49-092-ARO-114
Proj. DA-2T023201A-710-03-009

Descriptors: (*Scientific research, Bibliographies), Social sciences, Biology, Biophysics, Geophysics, Engineering, Mathematics, Physics, Chemistry.

The report is an annotated bibliography of reference works in physical science in general, in interdisciplinary science, and in non-disciplinary science - i.e., history, philosophy, logic, and metaphysics of science. (Author)

AD-635 811 **Field 5A, 5C**
CFSTI Prices: HC$3.00 MF$0.75
General Technical Services, Inc., Yeadon, Pa.
TECHNICAL FORECASTING: A PHYSICIST'S VIEW.
Rept. no. 3, Jun 65-Jul 66.
by Arthur S. Iberall. Jul 66, 62p
Contract DA-49-092-ARO-114
Proj. DA-2T023201A-710-03-009
See also AD-607 777.

Descriptors: (*Management planning, Economics), (*Economics, Probability), (*Scientific research, Probability), History theory, Sociology, Thermodynamics, Weapons, Warfare, Physics.

Identifiers: Prediction, Philosophy, Technology.

The report provides a novel philosophic view of the problem of Technological Forecasting. It embeds the problem in the statistical dynamics of human society, in full analogue to the statistical mechanics of molecular systems, and focuses on the ergodic nature of such ensembles or 'societies. The most significant forecasting range is thus to be directed at the changing of the boundary constraints for the system, rather than of its local directions and rates. (Author)

AD-636 091 **Field 5A**
CFSTI Prices: HC$7.00 MF$1.75
Army Research Office, Durham, N. C.
RESEARCH IN PROGRESS DURING CALENDAR YEAR 1965.
1965, 372p
Sponsored by ARO (D), AMC, ARPA, and DASA.

Descriptors: (*Army research, Reviews), Physics, Chemistry, Mathematics, Engineering, Metallurgy, Ceramic materials, Indexes, Abstracts, Bibliographies.

Research progress is presented in the following fields: physics, chemistry, mathematics, engineering, metallurgy and ceramics.

AD-636 175 **Field 5A, 5J, 12B**
CFSTI Prices: HC$2.60 MF$0.50
RAND Corp., Santa Monica, Calif.
DECISIONS, COMMUNICATION, AND ORGANIZATION.
by James Farmer. Dec 61, 30p P-2495
Prepared for presentation at Seminar in Organization Theory, Business Administration 290, Graduate School of Business Administration, University of California, Los Angeles, Dec 61.

Descriptors: (*Management planning, Mathematical models), (*Decision making, Management planning), Decision theory, Command + control systems, Information theory, Management control systems, Game theory.

Identifiers: Organizations, Organization theory.

The paper describes how mathematical models can be used in the theory of organization. Authority relationships are used to develop a canonical form of organization. Communication constraints on the canonical form are shown. A stratified organization, used when a canonical form cannot be used to satisfy the constraints, is described. Organizational effects of varying communication load and a sequential decision process model are discussed. (Author)

AD-476 443 **See Field 12A**

AD-635 688 **See Field 12A**

AD-635 900 **See Field 12B**

AD-635 930 **See Field 13M**

AD-635 931 **See Field 13M**

AD-636 057 **See Field 5K**

PB-170 736 **See Field 6E**

5B. DOCUMENTATION AND INFORMATION TECHNOLOGY

AD-636 275 **Field 5B**
CFSTI Prices: HC$6.00 MF$1.25
Massachusetts Inst. of Tech., Cambridge.
SEARCH PROCEDURES BASED ON MEASURES OF RELATEDNESS BETWEEN DOCUMENTS.
Doctoral thesis.
by Evan Leon Ivie. May 66, 243p MAC-TR-29
Contract Nonr-4102 (01)
Proj. NR-048-189
Rept. on Proj. MAC.

Descriptors: (*Information retrieval, Design), Search theory, Reports, Documentation, Computers, Effectiveness, Information theory.

Identifiers: MAC project.

A new type of information retrieval system is suggested which utilizes data of the type generated by users of the system instead of data generated by indexers. The theoretical model on which the system is based consists of three basic elements. The first element is a measure of the relatedness between document-pairs. It is derived from information theory. The second element is a definition of what constitutes a set (cluster) of inter-related documents. This definition is based on the measure of relatedness. The last element is a procedure which transforms a request for information into a cluster of answer documents. An experimental system was developed to test the model in a realistic environment. It was programmed for the Project MAC time-sharing system and utilized the physics data file of the Technical Information Project. Citations were used as the data base for the measure of relatedness. A file structure and retrieval language were designed which allowed close man-machine coupling. Retrieval efficiency compared to known sets was 60 - 90 percent, and ways of improving this further are suggested. (Author)

BNL-943 **Field 5B, 18B, 18D**
CFSTI Prices: HC$1.00 MF$0.50
Brookhaven National Lab., Upton, N. Y.
BIBLIOGRAPHY OF TECHNICAL PUBLICATIONS AND REPORTS OF THE RADIATION DIVISION, BROOKHAVEN NATIONAL LABORATORY, JANUARY 1963-JUNE 1965 INCLUSIVE.
by D. S. Ballantine, and L. E. Kopp. Jul 65, 5p
Contract AT (30-2)-GEN-16

Descriptors: (*Bibliographies, Nuclear particles).

For abstract, see N 20 15.

BNWL-113-15 **Field 5B, 6R, 11B, 7 K**
CFSTI Prices: HC$2.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
PLUTONIUM ABSTRACTS, VOLUME 6, NUMBER 3.
30 Apr 66, 39p
Contract AT (45-1)-1830

Descriptors: (*Plutonium, Bibliographies), (*Bibliographies, Plutonium).

For abstract, see N 20 15.

BNWL-218 **Field 5B, 6R, 7A, 7B K**
CFSTI Prices: HC$3.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
TECHNICAL PUBLICATIONS OF BATTELLE-NORTHWEST DURING 1965.
Mar 66, 52p
Contract AT (45-1)-1830

Descriptors: (*Bibliographies, Scientific research).

For abstract, see N 20 15.

CONF-651131 **Field 5B**
CFSTI Prices: HC$2.00 MF$1.00
Battelle Memorial Inst., Columbus, Ohio.
PROCEEDINGS OF FIRST AD-HOC FORUM OF SCIENTIFIC AND TECHNICAL INFORMATION ANALYSIS CENTER MANAGERS, DIRECTORS, AND PROFESSIONAL ANALYSTS, HELD AT BATTELLE MEMORIAL INSTITUTE, COLUMBUS, OHIO, NOVEMBER 9-11, 1965.
1965, 185p
Contract W-7405-eng-92
Prepared in cooperation with Oak Ridge National Lab., Tenn.

Descriptors: (*Symposia, Information theory).

Identifiers: Information centers.

For abstract, see N 20 15.

CONF-651131 (App.) **Field 5B**
CFSTI Prices: HC$1.50 MF$1.00
Battelle Memorial Inst., Columbus, Ohio.
DIRECTORY OF SELECTED SPECIALIZED INFORMATION SERVICES, ADHOC FORUM OF SCIENTIFIC AND TECHNICAL INFORMATION ANALYSIS CENTER MANAGERS, DIRECTORS, AND PROFESSIONAL ANALYSTS, HELD AT BATTELLE MEMORIAL INSTITUTE, COLUMBUS, OHIO, NOVEMBER 9-11, 1965.
1965, 130p
Contract W-7405-eng-92
Prepared in cooperation with Oak Ridge Natl. Lab. Tenn.

Descriptors: (*Directories, Libraries).

Identifiers: Information centers.

For abstract, see N 20 15.

N66-12194 **Field 5B**
CFSTI Prices: HC$2.00 MF$0.50
Alfred P. Sloan School of Management, Mass. Inst. of Tech., Cambridge.
SOURCES OF IDEAS AND THEIR EFFECTIVENESS IN PARALLEL R AND D PROJECTS.
by T. J. Allen. Jul 65, 26p
Grants NsG-235-62, NsF GN-233
NASA-CR-68156
Prepared for presentation at ONR Conference on Res. Program Effectiveness (2nd) Washington, D. C. 28 Jul 65. Paper no. 130-65.

Descriptors: *Information processing, *Program management, *Research project, *Laboratory.

N66-15386 **Field 5B**
CFSTI Prices: HC$3.00 MF$0.75
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PUBLICATIONS OF THE JET PROPULSION LABORATORY, JULY 1964 THROUGH JUNE 1965.
by R. L. Woods. 15 Dec 65, 74p JPL-BIBL-39-6
Contract NAS7-100
NASA-CR-69354

Descriptors: *Abstract, *Bibliography, *Mariner program, *Ranger project, *Surveyor project, *Deep space instrumentation facility (DSIF).

ORNL-NSIC-16 **Field 5B, 6R, 18D, 18I**
CFSTI Prices: HC$6.00 MF$1.25
Oak Ridge National Lab., Tenn.
INDEXED BIBLIOGRAPHY OF CURRENT NUCLEAR SAFETY LITERATURE-5.
Jun 66, 214p
Contract W-7405-eng-26

Descriptors: (*Bibliographies, Safety), (*Safety, Bibliographies).

For abstract, see N 20 15.

PB-169 969 **Field 5B, 14E, 9B**
CFSTI Prices: HC$6.00 MF$0.50
Information Dynamics Corp., Wakefield, Mass.
SELECTING A SYSTEM FOR PRODUCING HIGH QUALITY NASA ANNOUNCEMENT JOURNALS.
Engineering rept.
by Lawrence H. Berul. 1 Mar 62, 32p
Contract NASw-374
Prepared in cooperation with Documentation, Inc., Bethesda, Md. NSF Scientific Documentation Proj.

Descriptors: (*Periodicals, Printing), Automatic, Photograhic techniques, Indexes, Magnetic tape, Computers.

Identifiers: National Aeronautics and Space Administration, Photon, Photocomposition.

A rigorous engineering and cost analysis was made of 13 alternate systems selected from 38 production work places studied. The appearance of the end product obtainable from each system was evaluated by studying a wide variety of samples of existing publications and a series of comparable samples furnished by competing equipment manufacturers. It is recommended that the storage and assembly of the information be accomplished by computer, that the assembled copy be punched into eight-level tape, and that this paper tape be used to drive a tape-operated Phototypesetter. The Photon appears to be the equipment best suited to this task. It is equipped with a manual keyboard so that it can be operated manually until the required computer programming and systems engineering for tape operation is completed. The tape operating speed of the Photon is sufficient to handle the semi-monthly announcement journal with indices, but is not sufficient to handle the larger cumulative indices. For the present the cumulative indices can be produced on a 1403 chain printer. In one year to eighteen months, ZIP a new high speed phototypesetter under development by the Photon Corp., will be available. (Author)

PB-170 382 **Field 5B, 5I**
CFSTI Prices: HC$3.00 MF$0.50
Biological Sciences Communication Project, George Washington Univ., Washington, D. C.
SCIENCE INFORMATION ADMINISTRATOR TRAINING PROGRAM.
by Charles W. Shilling, and Joe W. Tyson. Apr 63, 19p BSCP-6-63-Rev
NSF Scientific Documentation Project PB-164 062 revised.

Descriptors: (*Documentation, Training), (*Training, Documentation), Medicine, Biology, Data processing systems, Libraries, Technical information centers, Professional personnel, Education, Scientific research.

A program of 'internship' for four graduate level students who wish to become information specialist administrators in the biological and medical sciences is outlined. It is to be divided into two parts: intensive formal study at the American University and other universities in Washington, D. C.; and on-the-job training.

PB-170 603 **Field 5B, 9B**
CFSTI Prices: HC$4.00 MF$0.75
Documentation Inc., Bethesda, Md.
REPORT ON THE UNITED STATES GEOLOGICAL SURVEY LITERATURE SEARCH SYSTEM.
Mar 66, 63p
NSF Scientific Documentation Project.

Descriptors: (*Geology, Information retrieval), (*Geophysics, Information retrieval), North America, Abstracts, Indexes, Computers, Printing, Automatic, Photographic techniques.

Identifiers: Photon, Photocomposition.

The U. S. G. S. Literature Search System is a comprehensive operation designed to provide the scientific community with extensive coverage of published geophysical and North American geological material. The overall system can be reviewed as three distinct but related functions. Research Unit operations begin with the source material acquisition. Books and periodicals provide the base for abstracting whether it is done within the Unit or in the field. A rough draft abstract is prepared, recorded, indexed and transposed to flexowriter paper tape and card copy. The computer converts the input data on paper tape to magnetic tape, prepares two files-the index file and the citation file, performs file sorting and prints out accepted and rejected entry lists. Computer printouts of accepted and rejected entries are proofed, and deletions noted and reprocessed for the following issue. The file is processed on the computer for Photon format and the paper tape output delivered for photocomposition page production. Photon page output is proofed by using a duplicate ozalid copy. Necessary changes are cut into the positive film and proofed. The completed positive film is processed to negatives and checked once more. (Author)

PB-170 620 **Field 5B**
CFSTI Prices: HC$6.00 MF$0.75
Syracuse Univ. Research Inst., N. Y.
A STUDY OF THE FREQUENCY WITH WHICH RUSSIAN, FRENCH AND GERMAN SCIENTIFIC ARTICLES ARE CITED IN SELECTED AMERICAN SCIENTIFIC JOURNALS.
1 Jun 66, 83p
Grants NSF-G19275.1, NSF-GN-501
NSF Scientific Documentation Project.

Descriptors: (*Periodicals, United States), (*Reports, Frequency), USSR, France, West Germany, East Germany, Documentation, German language, Russian language.

Identifiers: Citations.

Citations to the Selected Russian Journals have gradually increased over the years from 1951 through 1964 in the six U. S. journals covered by the study. During the same period of time, citations to German journals declined markedly and citations to French journals also declined but not as markedly. The rate of citations to the selected Russian Journals during 1964 exceeded the rate of citation to French articles and were showing an upward trend. This situation contrasts with 1951 when French citations and two and one half times greater than all Russian citations. Citations to the selected Russian Journals during 1964 were roughly at one half the rate of citations to German journals. At this time, however, the trend in use of German citations is markedly downward while the trend for the selected list is markedly upward. In 1951, German articles were cited at a rate ten times greater than the selected translations and six times greater than all Russian citations. During the three year period 1951-1953, the selected Russian Journals average 0.5% of all citations while German and French averaged 6.7% and 2.0% respectively. On the basis of the citation count made in this survey, the translations of selected Russian Journals are beginning to have more effect on U. S. scientific publication than French publications and have made great strides toward equalling the effect of German publications. (Author)

PB-170 702 **Field 5B**
CFSTI Prices: HC$6.00 MF$1.25
Harvard Univ., Cambridge, Mass. Computation Lab.
DOCUMENT RETRIEVAL SYSTEMS - OPTIMIZATION AND EVALUATION.
Doctoral thesis.
by Joseph John Rocchio Jr. Mar 66, 178p
Scientific rept. ISR-10

Rept. on Information Storage and Retrieval. NSF Scientific Documentation Project.

Descriptors: (*Information retrieval, Optimization), Subject indexing, Search theory, Correlation techniques, Documentation.

Identifiers: SMART.

A model for document retrieval systems consisting of the functional elements: indexing, search request formulation, and request-document matching is examined in this thesis. Analysis of the request formulation function leads to the definition of an optimality criterion and to a request optimization algorithm suitable for use in a system environment which allows iterative searching and real time user-system interaction. The optimality criterion has applicability to the evaluation of index languages, and generally to the design of evaluation tests for document retrieval systems. Investigation of the request-document matching leads to a novel automatic classification algorithm applicable to metric comparison measure, and useful for establishing an efficient storage organization. Finally the statistical basis for the evaluation of document retrieval systems is reviewed and some novel performance measures are proposed which are particularly suited to systems which induce a retrieval ordering on the members of the searched collection.

PB-170 725 **Field 5B**
CFSTI Prices: HC$1.10 MF$0.50
Rochester Univ., N. Y.
CROSS-REFERENCE INDEX IDENTIFYING RANGE OF SCIENTIFIC JOURNAL TITLES REPRESENTED BY ABBREVIATED CITATIONS.
by Phyllis A. Richmond. 1963, 2p
Proceedings of the ADI Annual Meeting (26th), Chicago, 1963, p225-6.

Descriptors: (*Periodicals, Indexes).

Identifiers: Abbreviations.

Journal title citations are so abbreviated and so ambiguous that identification of original source journals is difficult. An index is being compiled to provide all the full titles which may be pertinent to a given citation. A citation formula is sought which will identify each journal as a unique entity. (Author)

PB-170 769 **Field 5B**
CFSTI Prices: HC$3.00 MF$0.50
Yale Univ. New Haven, Conn.
NETWORKS OF SCIENTIFIC PAPERS. THE PATTERN OF BIBLIOGRAPHIC REFERENCES INDICATES THE NATURE OF THE SCIENTIFIC RESEARCH FRONT.
by Derek J. de Solla Price. 1965, 7p
Grant NSF-GN-299
NSF Scientific Documentation Project. Science v149 n3683 p510-5 30 Jul 1965.

Descriptors: (*Scientific research, Subject indexing), (*Indexes, Scientific research), Bibliographies, Reports.

Identifiers: Citation index, Scientific information.

From two different types of connections it appears that the citation network shows the existence of two different literature practices and of two different needs on the part of the scientist. (i) The research front builds on recent work, and the network becomes very tight. To cope with this, the scientist needs an alerting service that will keep him posted, probably by citation indexing, on the work of his peers and colleagues. (ii) Random scattering corresponds to a drawing upon the totality of previous work. In a sense, this is the portion of the network that treats each published item as if it were truly part of the eternal record of human knowledge. In subject fields that have been dominated by this second attitude, the traditional procedure has been to systematize the added knowledge from time to time in book form, topic by topic, or to make use of a system of classification optimistically considered more or less eternal, as in taxonomy and chemistry. It seems clear that in any classification into research-front subjects there will remain a large body of literature which is not completely the one or the other. The present discussion suggests that most papers, through citations, are knit together rather tightly. (Author)

PB-170 793 **Field 5B, 6A**
CFSTI Prices: HC$19.90 MF$1.25
American Univ., Beirut (Lebanon).
BIOCHEMISTRY: A DECIMAL CLASSIFICATION. VOLUME 2.
by John Hoke Schneider. 22 Jun 61, 203p
NSF Scientific Documentation Project.

Descriptors: (*Biochemistry, Classification), Physiology, Pathology, Pharmacology, Information retrieval.

PB-170 794 **Field 5B, 6A**
CFSTI Prices: HC$8.60 MF$0.75
American Univ., Beirut (Lebanon).
BIOCHEMISTRY: A DECIMAL CLASSIFICATION. VOLUME I.
by John Hoke Schneider. 16 Dec 60, 81p
NSF Scientific Documentation Project.

Descriptors: (*Biochemistry, Classification), Proteins, Carbohydrates, Vitamins, Enzymes, Amino acids, Biosynthesis, Lipids, Nucleic acids, Information retrieval.

PB-170 795 **Field 5B, 7C, 7A, 7B K**
CFSTI Prices: HC$15.40 MF$1.00
American Univ., Beirut (Lebanon).
ORGANIC CHEMISTRY, THE CHEMICAL INDUSTRY, AND PHYSICS: A DECIMAL CLASSIFICATION.
by John HokeSchneider. 6 Jun 60, 158p
NSF Scientific Documentation Project.

Descriptors: (*Organic compounds, Classification), (*Physics, Classification), (*Chemical industry, Classification), Nuclear energy, Quantitative analysis, Information retrieval.

AD-635 809 **See Field 9D**

PB-170 688 **See Field 6E**

PB-170 736 **See Field 6E**

5C. ECONOMICS

AD-635 848 **Field 5C, 12A**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
QUASI-EQUILIBRIA IN MARKETS WITH NON-CONVEX PREFERENCES.
by Ross M. Starr. Jul 66, 29p P-3407
Revision of Stanford Univ., Calif. Inst. for Mathematical Studies in the Social Sciences; Contract Nonr-225 (50), Proj. NR-047-004, TR-141, AD-630 627.

Descriptors: (*Mathematical models, *Economics), Decision making, Bargaining, Game theory.

For abstract, see T 66 17.

N66-12174 **Field 5C**
CFSTI Prices: HC$2.00 MF$0.50
Florida Univ., Gainesville. Bureau of Economic and Business Research.
ANALYSIS OF RETAIL TRADE IN THE CAPE KENNEDY AREA.
by R. H. Blodgett. 10 May 65, 34p
Grant NsG-507
NASA-CR-68282

Descriptors: *Cape Kennedy, *Nasa program, *Economics.

PB-169 739 **Field 5C, 8G**
CFSTI Prices: HC$4.00 MF$0.75
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
AUDIT AND EVALUATION OF MANUFACTURING OPERATIONS IN CARROLL COUNTY, GEORGIA.
Technical rept.
by M. Dale Henson, and Robert H. McDonough.
Feb 63, 105p Project A-619-TR-4

Descriptors: (*Georgia, Economics), (*Economics, Georgia), (*Industries, Georgia), Textile industry, Training, Education, Employment, Labor, Commerce.

Identifiers: Area redevelopment, Food industry.

An industrial council be formed to represent the interests of Carroll County manufactures. Immediate action be taken to expedite the establishment of vocational-technical training facilities in Carroll County. Further study be directed toward determining the adequacy of present service facilities in Carroll County. Primary industrial development efforts be directed toward the attraction and growth of industries that typically have a high male-female employment ratio. Local development groups devote more attention to the problems of existing manufacturers in the area. Carroll County manufacturers and development groups capitalize more effectively on one of the outstanding assets of the area – proximity to Atlanta. Further studies be undertaken to determine the feasibility of establishing manufacturing operations satellite to the existing industrial complex. The apparel, textile, metal-working and food industries appear most promising in this respect due to the volume of materials consumed.

PB-169 964 **Field 5C, 11L**
CFSTI Prices: HC$1.50 MF$0.50
Washington State Inst. of Tech., Pullman.
THE ECONOMIC POWER OF AN INTEGRATED WOOD PRODUCTS INDUSTRY FOR FERRY COUNTY, WASHINGTON.
by George G. Marra. Jan 64, 23p Bulletin-283

Descriptors: (*Economics, Washington), (*Washington, Wood), (*Wood, Washington), Industries, Forestry.

Identifiers: Wood industry.

Ferry County, a timbered county with many small sawmills in northeast Washington, has suffered a steady economic decline and unemployment has now reached a critical level. Lumber, as the sole wood product, has restricted this county to a low level of technological development. Rehabilitation of the wood industry requires that a more intensive degree of utilization be practiced on the harvested tiber and that diversified products displace lumber as the major product. Residues must be utilized to the fullest extent possible in order to spread log costs over a broad base. Outlets for low-grade lumber must be found, preferably in the form of remanufactured products. Investment capital is unavailable in the area and in order to attract it from outside, competitive advantages must be clearly demonstrated. The only reasonable approach to these problems is through the medium of an integrated wood industry of moderate size with built-in elements for survival and longevity. (Author)

PB-170 213 **Field 5C**
CFSTI Prices: HC$1.50 MF$0.50
Princeton Univ., N. J. Econometric Research Program.
THE DETERMINANTS OF MEMBER-BANK BORROWING: AN ECONOMETRIC STUDY.
by Stephen M. Goldfeld, and Edward J. Kane.
Mar 66, 33p Research memo. no. 81
Grant NSF-GS-551

Descriptors: (*Banking, Economics), Mathematical models, Factor analysis, Money, Decision making.

Identifiers: Borrowing.

The paper presents a formal model of commercial-bank borrowing from the Federal Reserve System which integrates profit, need, and surveillance considerations. A static model is developed. Dynamic factors are then introduced and are shown to imply a distributed-lag reaction on the part of the banks. Empirical evidence in support of the model is presented. Multiple regression equations are estimated with weekly data for several categories of member banks. The results indicate that member-bank borrowing can be successfully explained by the factors put forth in the paper. Significant behavioral differences are found among the various classes of banks. (Author)

PB-170 297 **Field 5C, 8F, 11L, 2F**
CFSTI Prices: HC$1.00 MF$0.50
MacDonald Associates, Inc., Washington, D. C.
WOOD INDUSTRY STUDY DEVELOPMENT, EASTERN KENTUCKY.
Supplemental summary rept.
Jan 64, 5p
Contract CC-6089
Proj. 1

Descriptors: (*Economics, Kentucky), (*Kentucky, Industries), (*Wood, Industries), Commerce, Processing, Forestry.

Identifiers: Area redevelopment, Wood industry.

A very favorable attitude exists in Eastern Kentucky toward the implementation of an expanded wood processing industry. However, companion to this favorable attitude, which is region wide, only limited cooperation in support of the project is being exercised between area groups living within the region. This has had a restraining action upon expected progress in organizing the proposed new industry, but it has not been a preventative factor to motivating a reasonable level of participant interest. Kenwood Products, Inc. was established as a Kentucky corporation to serve as a business entity to carry out the plan of the project. That corporation is a product of the combined organizational efforts of the Contractor, the Kentucky Forestry and Timber Industry Task Force, and business and community leaders from Eastern Kentucky. It is intended by the corporate founders that Kenwood Products, Inc. will serve as the principal corporation to carry out the plan of industry proposed by the Contractor's Phase III report. The corporation is now engaged in a program of financing its plans and presenting its program to the investing public in an effort to engender private investor support through the purchase of capital stock.

PB-170 512 **Field 5C, 8F**
CFSTI Prices: HC$6.00 MF$1.25
International Customs Tariffs Bureau, Brussels (Belgium).
SPAIN.
10th ed., Year 1965-1966.
Mar 66, 216p
Pub. as International Customs Journal Bull-24.

Descriptors: (*Spain, Economics).

Identifiers: Tariffs.

PB-170 524 **Field 5C, 8G**
CFSTI Prices: HC$1.00 MF$0.50
Surveys and Research Corp., Washington, D. C.
POTENTIAL IMPACT OF THE GRAFTON LUMBER COMPANY ON THE BIDDEFORD-SACO AREA.
1962, 22p

Descriptors: (*Economics, Maine), (*Maine, Economics), (*Wood, Industries), Employment, Labor, Population, Wages.

Identifiers: Area redevelopment, Wood industry, Taxes, Income, Lumber.

The analysis indicates some of the direct as well as indirect benefits which may ensue from the operations of the Grafton Lumber Mill. In economic terms alone these benefits, based on the very tentative estimates of prospective jobs and payrolls now available, may appear as relatively modest. It should be recognized that jobs for unemployed workers have far wider implications. To the unemployed worker a job means not only a pay check, it means self respect and ability to function more effectively as a member of the community in which he lives. (Author)

PB-170 595 **Field 5C, 15F**
CFSTI Prices: HC$6.00 MF$1.00
Stanford Research Inst., Menlo Park, Calif.
A SYSTEM ANALYSIS OF THE EFFECTS OF NUCLEAR ATTACK ON RAILROAD TRANSPORTATION IN THE CONTINENTAL UNITED STATES.
by Harvey L. Dixon, Dan G. Haney, and Paul S. Jones. Apr 60, 227p
Contracts CDM-SR-59-19, CDM-SR-60-19
Proj. SR-IU-3084

Descriptors: (*Nuclear explosion damage, Railroads), (*Railroads, Nuclear explosion damage), Threat evaluation, Nuclear warfare, Transportation, United States, Damage assessment.

AD-430 728 **See Field 5K**

AD-635 775 **See Field 8F**

AD-635 811 **See Field 5A**

AD-635 930 **See Field 13M**

PB-169 958 **See Field 13B**

PB-170 581 **See Field 13B**

PB-170 663 **See Field 13J**

PB-170 771 **See Field 5K**

PB-170 772 **See Field 5K**

PB-170 773 **See Field 5K**

PB-170 774 **See Field 5K**

PB-170 775 **See Field 5K**

PB-170 776 **See Field 5K**

PB-170 777 **See Field 5K**

PB-170 778 **See Field 5K**

PB-170 779 **See Field 5K**

PB-170 780 **See Field 5K**

PB-170 781 **See Field 5K**

PB-170 782 **See Field 5K**

PB-170 783 **See Field 5K**

PB-170 784 **See Field 5K**

PB-170 785 **See Field 5K**

PB-170 786 **See Field 5K**

PB-170 787 **See Field 5K**

5D. HISTORY, LAW, AND POLITICAL SCIENCE

AD-635 972 **Field 5D**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
UNREST AND COHESION IN THE ATLANTIC ALLIANCE: NATO AND THE GERMAN QUESTION.
by Horst Mendershausen. Apr 66, 46p RM-4936-PR
Contract AF 49 (638)-1700

Descriptors: (*Europe, *Foreign policy), (*Political science, Europe), United States Government, USSR, East Germany, West Germany.

Identifiers: NATO.

The current difficulties are seen as part of a traditional tension within NATO, not as result of the detente between USSR and the West. Two key factors explain the continuing unrest in the Alliance: (1) the high degree of institutionalization of the military pact in peacetime, and (2) the deep involvement of the Alliance with the unfinished business of World War II, divided Germany. These two elements also explain the cohesion of the Alliance. The author details the reasons for this paradox and shows why the Alliance has not outlived its usefulness. Included in the discussion are the indispensable role of NATO as a regional peace system, the complex political problems of such a system, and the confusion created by juxtaposing peace-oriented political managment and war-oriented military posture when there is no acute conflict between USSR and the Alliance. (Author)

AD-430 728 **See Field 5K**

AD-436 429 **See Field 15G**

5E. HUMAN FACTORS ENGINEERING

AD-636 082 **Field 5E**
CFSTI Prices: HC$4.00 MF$0.75
Human Engineering Labs., Aberdeen Proving Ground, Md.
MILESTONES: A DIRECTORY OF HUMAN ENGINEERING LABORATORIES PUBLICATIONS, 1953-1965.
by Donna M. Warren. Dec 65, 109p

Descriptors: (*Human engineering, Bibliographies), Abstracts, Reports, Directories.

For abstract, see T 66 17.

AD-636 170 **Field 5E, 5H, 9B**
CFSTI Prices: HC$4.00 MF$0.75
Institute for Defense Analyses, Arlington, Va. Research and Engineering Support Div.
HUMAN FACTORS PROBLEMS IN COMPUTER-GENERATED GRAPHIC DISPLAYS.
by Joseph E. Barmack, and H. Wallace Sinaiko.
Apr 66, 118p IDA/HQ-66-4820, Study S-234
Contract SD-50

Descriptors: (*Human engineering, Display systems), (*Display systems, Graphics), Computers, Man-machine systems, Input-output devices, Theory, Light, Colors.

The study is a review of current practices in computer-generated graphic displays from the point of view of engineering psychology. Input devices, which are integral to man-computer systems, are also considered. Theories of cognition are examined with respect to their applicability to computer-graphics. (Author)

PB-170 825 **Field 5E, 17G**
CFSTI Prices: HC$2.00 MF$0.50
Civil Aeromedical Research Inst., Oklahoma City, Okla.
DEVELOPMENT AND EVALUATION OF A RADAR AIR TRAFFIC CONTROL RESEARCH TASK.

by Richard G. Pearson, Clifton E. Hunter, and Gilbert L. Neal. Dec 65, 31p
AM-65-31

Descriptors: (*Radar equipment, Air traffic control systems), (*Air traffic control systems, Human engineering), Air traffic controllers, Training devices, Systems engineering, Design.

A system is described in which various elements of the radar air traffic controller's task can be presented repeatedly, reliably, and concurrently to each of six experimental subjects seated at separate task consoles. Programming of display conditions designed to test such operator skills as vigilance, problem solving, monitoring, and reaction time, and the electronic scoring of subject responses are accomplished automatically. Results from initial experimentation involving enroute ATC, terminal, and flight service station personnel support the design rationale for the experimental task. Approximately 8 hr of practice are required for subjects to integrate effectively all subtasks and to achieve a stable level of proficiency. Suggestions are made for use of the system in human factors research on ATC operator problems and for modification as a training device. Technical appendixes include description of a complete problem script and of the electrical-engineering design characteristics of the programming-data-acquisition system. (Author)

5G. LINGUISTICS

AD-635 934 **Field 5G, 9B**
CFSTI Prices: HC$3.00 MF$0.50
RAND Corp., Santa Monica, Calif.
THE TABULAR PARSER: A PARSING PROGRAM FOR PHRASE STRUCTURE AND DEPENDENCY.
by Martin Kay. Jul 66, 55p RM-4933-PR
Contract AF 49 (638)-1700

Descriptors: (*Computational linguistics, Programming (Computers)), Algorithms, Grammars, Machine translation, Punched cards.

Identifiers: FORTRAN IV language, MAP programming language, Strings (Linguistics), Sentences.

A comparison of phrase structure and dependency grammars and description of a computer program for parsing sentences concurrently by both systems with cross references. A simple, concise notation system, rule tables, and directions for punched-card input are given for use with a FORTRAN IV program with MAP subroutines. The program itself is the same without regard to language, rules, or directory entries input, and is based on a morsel strategy, described in ALGOL logic. (Author)

PB-170 215 **Field 5G**
CFSTI Prices: HC$1.50 MF$1.25
Ohio State Univ. Research Foundation, Columbus.
EMBEDDING STRUCTURES IN MANDARIN.
by Anne Yue Hashimoto. Mar 66, 260p Rept. no. 12
Grant NSF-GN-174
Proj. RF-1685-5
Proj. on Linguistic Analysis.

Descriptors: (*Chinese language, Linguistics), Transformational grammars, Analysis, Grammars.

Identifiers: Mandarin, Embedding structures.

The study is devoted to the specification of the deep structure of several types of embedding sentences in Mandarin. The embedding structures discussed are of two types: embedding structures in the noun phrase constituent and those in the verb phrase constituent, the noun phrase and the verb phrase being the chief constituents in a Mandarin sentence. Within each type are two main kinds of embedding constructions: for the former, the relative clause and nominlized sentences are the topics, and for the latter, the comparative construction as well as verbal complements. (Author)

AD-635 944 **See Field 9D**

5H. MAN-MACHINE RELATIONS

AD-465 088 **Field 5H, 9B, 14B**
CFSTI Prices: HC$17.80 MF$1.00
Massachusetts Inst. of Tech., Cambridge.
PROJECT MAC. PROGRESS TO JULY 1964.
1 Jul 64, 182p MAC-PR-1
Contract Nonr-4102 (01)
Proj. NR-048-189

Descriptors: (*Engineering personnel, Computers), (*Scientific personnel, Computers), (*Digital computers, Data processing systems), Education, Scientific research, Engineering, Civil engineering, Electronics laboratories, Social sciences, Management engineering, Programming (Computers), Documentation, Artificial intelligence, Cybernetics, Optimization, Time.

The broad goal of Project MAC is experimental investigation of new ways in which direct links to on-line computers can aid people in their individual work; whether research, engineering design, management, or education. (Author)

AD-469 621 **Field 5H, 15E**
CFSTI Prices: HC$2.60 MF$0.50
RAND Corp., Santa Monica, Calif.
MAN-MACHINE SIMULATION EXPERIENCE.
by Murray A. Geisler, and Allen S. Ginsberg. Aug 65, 26p P-3214
Prepared for presentation at Computing Symposium: Simulation and Gaming, 7-9 Dec 64, Yorktown Heights, N. Y.

Descriptors: (*Man-machine systems, Simulation), (*Operations research, Programming (Computers)), Decision making, Management planning, Logistics, Distribution, Maintenance, Maintenance personnel, Ground support equipment, Analysis, Mathematical prediction, Mathematical models, Management engineering, Data, Game theory.

The purpose of this paper is to present a general discussion of the technique of man-machine simulation or game-simulation, drawing, in particular, on the experiences of The RAND Corporation's Logistics Simulation Laboratory (LSL).

AD-636 251 **Field 5H, 9B**
CFSTI Prices: HC$3.00 MF$0.75
Computer Command and Control Co., Washington, D. C.
A DATA STRUCTURE FOR DIRECTED GRAPHS IN MAN-MACHINE PROCESSING.
Annual rept.
by William C. Mann, and Paul A. Jensen. 20 Jun 66, 76p Rept. no. 77-106-1
Contract Nonr-4815 (00)
Proj. RR-003-10-02

Descriptors: (*Man machine systems, *Pattern recognition), Information theory, Data processing systems, Problem solving, Graphics.

This report describes research in information processing intended for application to man-machine communication processes. In order to allow a computer user to represent some problems more easily, we would like to let him name and define relations between information entities with which he deals, and then manipulate a large number of such relations stored by the computer. A set of statements on the relative desirability of various conditions is an example of a set of relations which the user might want to store and manipulate. The problem is that available representations for such sets of relations tend to be unwieldy and may require a great deal of processing for large numbers of relations. In order to make such a capability available, compact and easily-manipulated internal computer representations for large numbers of the various kinds of two-entity relations must be found. This report describes such a development for one basic logical form of relation, the transitive, anticommutative relation exemplified by 'prcedes'', 'includes', 'is greater than', and similar phrases. The report describes a method for storing directed graphs (of transitive anticommutative relations) in a list-structured computer memory. There are three important features of this representation method: A method of dividing a graph into a number of strata based on the lengths of paths in the graph, a recursive decomposition technique which produces successively less complex versions of the graph, and a recursive search technique which utilizes the stratification and decomposition to extract information from the graph with a limited amount of processing effort. (Author)

N66-12195 **Field 5H**
CFSTI Prices: HC$3.00 MF$0.75
Bell Helicopter Co., Fort Worth, Tex.
RESEARCH ON UTILIZATION OF PART TASK SPATIAL ORIENTATION INFORMATION IN THE DYNAMIC SIMULATOR.
by B. A. Abbott, and C. B. Elam. Jun 65, 86p TR-299-099-284
Contract NASw-439
NASA-CR-68219

Descriptors: *Control simulator, *Error function, *Pilot performance, *Statistical analysis.

For abstract, see T 66 17.

AD-635 979 **See Field 13J**

AD-636 170 **See Field 5E**

5I. PERSONNEL SELECTION, TRAINING, AND EVALUATION

AD-635 585 **Field 5I, 13J**
CFSTI Prices: HC$3.00 MF$0.75
National Academy of Sciences-National Research Council, Washington, D. C. Shipboard Mechanization/ Manpower Comm.
MANPOWER STATUS OF THE U. S.-FLAG OCEANGOING MERCHANT MARINE.
Interim rept.
Jun 66, 95p
Contract Nonr-2300 (23)

Descriptors: (*Merchant vessels, *Manpower studies), United States, Shipborne, Naval personnel, Government employees, Civilian personnel, Personnel management.

The report contains estimates of the requirements for and availability of seagoing personnel to man the current U. S.-flag oceangoing merchant marine. Data are presented separately for the MSTS Civil Service-manned fleet and for privately operated oceangoing ships. Great Lakes ships are excluded. (Author)

AD-635 597 **Field 5I**
CFSTI Prices: HC$1.00 MF$0.50
Naval Personnel Research Activity, San Diego, Calif.
EVALUATION OF A TECHNIQUE FOR CLASSROOM PRACTICE IN DECISION MAKING.
Research rept.
by Norman M. Abrahams. May 66, 17p SRR-66-18
Proj. PF017030207

Descriptors: (*Decision making, Teaching methods), (*Military training, Decision making), Antiaircraft defense systems, Effective-

ness, Psychometrics, Threat evaluation, Students, Officer personnel.

Identifiers: Evaluation.

A study was conducted to evaluate, in terms of student interest and instructional effectiveness, individually administered notebook exercises in anti-air warfare decision making. One group of student officers received the notebook exercises and conventional instruction while another served as the control group for comparison purposes and had only the conventional instruction. Both groups took a criterion test after all instruction was completed. From the criterion test it was tentatively concluded that the exercises improved decision quality. Additional data from a questionnaire clearly indicated that students find such an approach interesting and helpful. (Author)

AD-635 602 **Field 5I, 5J**
CFSTI Prices: HC$1.00 MF$0.50
Naval Aerospace Medical Inst., Pensacola, Fla.
PERCEPTIONS AND ATTITUDES OF AVIATORS TOWARD VOLUNTARY WITHDRAWAL FROM FLIGHT TRAINING.
Special rept.
by Richard S. Pomarolli. 8 Jun 66, 17p SR-66-4

Descriptors: (*Training, Attrition), (*Attrition, *Attitudes), (*Aviation personnel, Attrition), Perception (Psychology), Decision making, Flight.

The study used a questionnaire approach to investigate perceptions and attitudes of 'winged' aviators toward voluntary withdrawal (DOR) from flight training. Results reveal widespread disagreement between DOR students and the aviators regarding what factors are of primary importance in the DOR students and the aviators regarding what factors are of primary process. In the assessment of pilot attitudes toward DOR'ing, the great majority of the group sampled expressed realistic and accepting attitudes toward this phenomenon. It is recommended that pilots assigned to instructional duty receive thorough instruction regarding the factors in the DOR process. (Author)

AD-635 617 **Field 5I, 5J**
CFSTI Prices: HC$1.00 MF$0.50
Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
ATTITUDES OF MARINES DURING FIRST ENLISTMENT.
by Paul D. Nelson, and Newell H. Berry. May 66, 14p Rept. no. 66-21
NAVMED-MF022.01.04-9001

Descriptors: (*Naval personnel, *Attitudes), Marine Corps, Leadership, Training, Education.

The attitudes held by enlisted Marines towards reenlistment, leadership, and their military organization were assessed after ten weeks of basic training and again after two years of service. Two-year attitudes were positive in affect although somewhat lower in intensity than those held upon completion of basic training. Variations in attitude were related to pre-service educational attainment and occupational assignment in the Marine Corps. (Author)

AD-635 624 **Field 5I, 13J**
CFSTI Price: MF$1.00
National Academy of Sciences-National Research Council, Washington, D. C. Maritime Cargo Transportation Conference.
SAN FRANCISCO PORT STUDY. VOLUME I. DESCRIPTION AND ANALYSIS OF MARITIME CARGO OPERATIONS IN A U. S. PORT.
1964, 148p
NAS-NRC-Pub-1140A

Descriptors: (*Cargo, Handling), (*Cargo ships, Operation), Manpower studies, San Francisco Bay, Labor, Personnel management, Job analysis, Piers.

Contents: Ships, Cargo tonnage task, Labor force, Terminal facilities, System performance of the port, The stevedoring task, A method for evaluating performance, Special problems, Physical description of the cargo handling system, Productivity analysis, Time and activity analysis, Ship design considerations, System capability.

AD-635 625 **Field 5I, 13J**
CFSTI Price: MF$1.00
National Academy of Sciences-National Research Council, Washington, D. C. Maritime Cargo Transportation Conference.
SAN FRANCISCO PORT STUDY. VOLUME II. TESTS OF MODIFIED CARGO-LOADING METHODS AND THE PORT AS A SYSTEM.
1966, 130p
NAS-NRC-Pub-1140B
See also AD-635 624.

Descriptors: (*Cargo, Handling), Manpower studies, Cost effectiveness, Management engineering, Job analysis, San Francisco Bay, Piers, Labor, Personnel management, Cargo ships.

Contents: Factors beyond test control, Performance and results of tests, Manpower management, Stevedoring planning and control, Cost comparisons, Cargo-handling tests on San Francisco Piers, The port as a system.

AD-635 701 **Field 5I**
CFSTI Prices: HC$3.00 MF$0.75
Cedarville Coll., Ohio.
MOTIVATION OF ENGINEERS UNDER CIVIL SERVICE AND THE SYSTEMS MANAGEMENT CONCEPT WITH A METHOD OF PROGRAM EVALUATION.
by Herman R. Chandler. 1966, 87p

Descriptors: (*Engineering personnel, Motivation), Systems engineering, Employee relations, Government employees, Training, Supervisory personnel, Wages, Performance (Human).

CONCLUSIONS: Many Incentive measures are utilized for motivation of the engineer under civil service. In general they are well documented, effective and actively supported. Unfortunately, the most effective measure, that of weekly first line supervisor-employee briefings, is undocumented and not specifically required in most organizations. (Author)

AD-635 772 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Naval Training Device Center, Port Washington, N. Y.
INVESTIGATION OF THE IMAGING AND LUMINANCE CHARACTERISTICS ASSOCIATED WITH POINT LIGHT PROJECTION.
Technical rept.
by Robert J. Klaiber. Oct 65, 33p
NAVTRADEVCEN-IH-44

Descriptors: (*Viewing screens, *Training devices), Optical images, Illumination, Reflection, Surface properties, Geometric forms, Design, Errors, Distortion.

Identifiers: Point light projection.

Because of practical geometric limitations imposed on point light projection and the wide field of view achieved, certain requirements on projection screen contour exist. These requirements stem from imaging distortions and errors and illumination deficiencies, some of which are inherent and others introduced by improper screen design. In the paper the prominent imaging errors are derived and catalogued for several screen contours, in addition to luminance characteristics. It is found that suitable precautions can negate most of the imaging errors but the screen luminance characteristics are controlled by the Fresnel reflection losses at the transparency. A suitable balance between illumination, imaging errors and construction ease for initial research programs resulted in choice of a surface whose cross section is a catenary. (Author)

AD-635 850 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Naval Personnel Research Activity, San Diego, Calif.
A COMPUTER PROGRAM FOR THE DETERMINATION OF AN OPTIMAL ADVANCEMENT POLICY FOR PETTY OFFICERS: A DYNAMIC PROGRAMMING APPROACH.
Research memo.
by William J. Moonan, and Margaret H. Covher.
May 66, 48p SRM-66-31
Proj. PF016010905

Descriptors: (*Naval personnel, Personnel management), (*Personnel management, *Dynamic programming), Manpower studies, Programming (Computers), Optimization, Management planning, Flow charting, Operations research, Mathematical models.

An important function of personnel planners in the Bureau of Naval Personnel is concerned with the establishment of advancement policies of Petty Officers in various Navy ratings. This report describes the details of a digital computer program which will permit the determination of the optimum advancement policy for a rating for one time period. Consequently the use of this program will materially assist these planners to perform their duties more effectively. The background material, flowcharts, operating procedures and illustrative example are provided. The method of optimization used is known as dynamic programming. The report indicates that this work is being generalized for use over several time periods. (Author)

AD-635 862 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
TOTAL OFFICER PERSONNEL SYSTEM FOR THE FUTURE (TOPS). PHASE I. PROPOSED OFFICER CLASSIFICATION AND CODING SYSTEM FOR THE NEXT DECADE.
Interim rept., Jul 65-Jun 66.
by Jack M. Pugh, Walter L. Himes Jr, and Emma R. Hubbs. Jul 66, 35p WRM-67-1
Proj. PF0160102

Descriptors: (*Naval personnel, Officer personnel), (*Officer personnel, Classification), Standards, Military requirements, Manpower studies, Personnel management, Data processing systems.

The memorandum contains the preliminary results of the first phase of research on the Total Officer Personnel System (TOPS). Phase I is concerned with the officer classification and coding system, with standards (criteria) for assignment of codes. It must meet the Navy's needs in the next decade; be designed to make advantageous use of data processing equipment and procedures; and provide maximum assistance to manpower managers in personnel management and administration decision making. Research to date has consisted of: Searching the literature; determining needs; defining the problem; developing guidelines for the system; comparing and analyzing the present Navy officer classification and coding system in relation to those of the other armed services; Civil Service, United States Employment Service (DOT), etc. A hypothetical structure is presented to serve as the basis for the design of the future system through test and evaluation of the classification elements (structures) and various methods of obtaining digital coding significance. (Author)

AD-635 869 **Field 5I, 20E, 14E**
CFSTI Prices: HC$2.00 MF$0.50
Naval Training Device Center, Port Washington, N. Y.

A STUDY OF 3-D EFFECTS IN VISUAL SIMULATION, PHASE I.
Technical rept. Jan-Nov 65.
by H. Caligiuri. Jun 66, 31p
NAVTRADEVCEN-IH-53
Task 7883-6
Rept. on An Analysis of the Factored Transparency Method.

Descriptors: (*Optical images, Synthesis), (*Training devices, Simulators), (*Stereoscopic display systems, Training devices), Film readers, Films, Optical properties, Photographic techniques, Lasers, Cathode ray tube screens, Terrain, Analysis, Simulation.

Identifiers: Holography.

The report contains the analysis of the factored transparency film storage method of generating images of three-dimensional objects or terrain on a TV screen. The special set of factored transparencies containing the elevation and ground terrain information is read out by using a standard TV type of flying spot scanner and photomultiplier tubes. The description includes the system's deficiencies and drawbacks. Another method of three-dimensional image generation using a laser beam coherent light source is briefly described and the possible application using a hologram type of film storage media is included. (Author)

AD-635 885 **Field 5I, 5K**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
A TRANSPORTATION PROGRAM FOR FILLING IDLE CLASSROOMS IN LOS ANGELES.
by D. Ray Fulkerson, Arnold Horelick, Lloyd S. Shapley, and Daniel M. Weiler. Jul 66, 19p P-3405

Descriptors: (*Students, Transportation), (*Education, Urban areas), Children, Passenger vehicles, Statistical data, Feasibility studies, California.

Identifiers: Schools, Los Angeles, Negroes.

On March 21, 1966, Transport-A-Child (TAC), a private non-profit educational foundation, presented to the Los Angeles Board of Education a proposal to alleviate over-crowding and de facto segregation in Los Angeles elementary schools by means of free and strictly voluntary bus transportation of children from overcrowded schools to schools in other parts of the city with available unused classroom space. This paper is the text of that proposal.

AD-635 901 **Field 5I, 9B**
CFSTI Prices: HC$3.00 MF$0.75
Naval Personnel Research Activity, San Diego, Calif.
A COMPUTER TECHNIQUE FOR CLUSTERING TASKS.
Progress rept.
by Joe Silverman. Apr 66, 74p STB-66-23
Proj. PF016011001
See also AD-465 851, AD-620 839, AD-620 840.

Descriptors: (*Job analysis, Statistical processes), (*Statistical processes, Data processing systems), Computers, Human engineering, Classification, Naval personnel.

Identifiers: SAMOA, Clustering (Psychology).

The report describes an advanced computerized technique for clustering work tasks. The ultimate objective of this research is to devise a method for determining the basic technical skills needed to man current and future weapons and support systems in order to provide a basis for the Navy enlisted personnel classification structure required in the next decade. This technique produces homogeneous clusters of task patterns using an input of tasks performed in a sample of jobs. These clusters represent the occupational specialties that exist in a field of work. The most important features of this technique are: (1) its capacity for computer analysis of task patterns of large numbers of subjects; (2) its capability for computer assistance in making research decisions at various levels of task analysis; and (3) its flexibility as a tool of pattern recognition and structuring. With only minor modifications, the computer programs and concepts described in this report should be of interest to those concerned with other clustering, classifying, and taxonomic techniques. (Author)

AD-636 150 **Field 5I**
CFSTI Price: MF$1.50
National Academy of Sciences - National Research Council, Washington, D. C.
SHIPBOARD MANPOWER. A STATISTICAL STUDY OF MEN IN THE U. S. MERCHANT MARINE 1962-1963. VOLUME II. APPENDIXES.
1966, 301p
AD 635 152 and AD 636 150 to be sold as a two volume set for $12.00.

Descriptors: (*Manpower studies, *Merchant vessels), Shipborne, Naval personnel, Officer personnel, Personnel management, Statistical analysis.

The report presents basic information (as of 1962-1963) for personnel sailing on ships of the commercial U. S.-flag merchant marine and the Military Sea Transportation Service (MSTS). For commercial personnel, information on employment, union and union-management affiliation, age, length of service, attrition, and qualifications is given; for MSTS personnel, employment, age, length of service, and qualifications. Information sources include U. S. Coast Guard and MSTS records and a questionnaire survey of the membership of the International Organization of Masters, Mates and Pilots, AFL-CIO. The report is part of the Shipboard Mechanization and Manpower (SM and M) Study, whose objective is to evaluate the effects of proposed system changes in shipboard equipment and manpower upon the U. S. merchant marine. (Author)

AD-636 166 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Human Resources Research Office, George Washington Univ., Alexandria, Va.
AN EXPERIMENTAL EVALUATION OF A DRIVER SIMULATOR FOR SAFETY TRAINING.
Technical rept.
by A. James McKnight, and Harold G. Hunter.
Jun 66, 35p TR-66-9, Exploratory Study-20
Contract DA-44-188-ARO-2
Proj. DA-2J024701A712
Task 01

Descriptors: (*Motor vehicle operators, *Simulators), (*Training, Safety), Effectiveness, Army personnel, Army training, Motion pictures, Training devices, Passenger vehicles.

Identifiers: Evaluation.

The purpose of this research was to determine the effectiveness of automobile simulators in fostering the safe operation of automobiles. A 20-hour driver improvement course was administered to 238 licensed drivers at Fort Lewis, Washington. Approximately half of the trainees received a program taught entirely by conventional methods, while the other half received a program of similar content but including eight hours of simulator instruction. Results of specially constructed tests indicated that simulators were superior to conventional media for developing good driving habits but were no more effective in teaching driving knowledges or influencing driver attitudes. It was concluded that, while simulation represents a potentially valuable means of improving driver habits and skills, substantial modification of current simulator equipment and film is needed to attain this potential. (Author)

AD-636 212 **Field 5I, 9B**
CFSTI Prices: HC$2.00 MF$0.50
Naval Personnel Research Activity, San Diego, Calif.
PROGRAM GENDET: MANUAL FOR USE OF COMPUTER IN ENLISTED CLASSIFICATION PROJECT COMPASS, PART IV.
Technical bulletin.
by Bruce R. Wood, Carl C. Schuster, and John D. Martin. May 66, 39p STB-66-31
Proj. PF016050201
See also AD-632 741.

Descriptors: (*Naval personnel, Personnel management), (*Personnel management, *Programming (Computers)), Selection, Classification, Recruiting, Data processing systems, Education, Job analysis.

Identifiers: Compass project, Gendet program.

The report describes the operation and use of Program GENDET, the fourth part of Project Compass, a Computer Assisted Classification and Assignment System. Program GENDET selects and assigns graduation rates and Naval Enlisted Classification Codes to recruits. These recruits were recommended for fleet assignments or were recommended for a naval school, but due to quota limitations, were unable to be selected for class 'A' school training. (Author)

AD-636 213 **Field 5I, 5J**
CFSTI Prices: HC$1.10 MF$0.50
Naval Personnel Research Activity, Washington, D. C.
THE CAREER MOTIVATION SURVEY: OVERALL ATTITUDE AND REENLISTMENT TRENDS.
Research rept.
by A. S. Glickman. Jun 61, 10p RR-61-2

Descriptors: (*Naval personnel, *Motivation), Attitudes, Recruiting, Training.

An overview is presented of changes during the first enlistment, in attitudes toward the Navy and in reenlistment intentions of 9,000 men who entered the Navy in the Fall of 1956 on Regular Navy enlistments and were of Mental Levels I, II, and III. Attitudes declined progressively with time. The sharpest decline, reflected also in reenlistment intentions, occurred in the four months following recruit training. Reenlistment intentions were highest during recruit training, lowest during the first half of the third year, and turned upward during the fourth year. The number of "undecided" declined progressively. The trends suggest that impetus be given to work on developing "pro-Navy" reenlistment-oriented attitudes from the first day of recruit training, if not before, with special attention being given to improving the transition from "boot" to "sailor." Development of relatively long-range forecasting of reenlistment rate appears to be possible. (Author)

AD-636 259 **Field 5I**
CFSTI Prices: HC$2.00 MF$0.50
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
QUALIFICATIONS AND RELATED TRAINING FOR NAVAL RESERVE OFFICERS (1105) NAVAL WARFARE/ OPERATIONS, SURFACE; ANTI-SUBMARINE WARFARE.
by Charles A. Hart. Jun 66, 35p WRM-66-64
Proj. PF017010201

Descriptors: (*Naval personnel, Naval training), (*Officer personnel, Naval training), (*Antisubmarine warfare, *Naval training), Standards, Job analysis.

The memorandum reports on the development of qualifications standards and related training for all 1105 officers assigned to the ASW program. These qualifications standards were developed as a part of the professional development system for Naval Reserve officers not on active duty. It should be noted that the ASW qualifications outlined in the memorandum are in addition to the requirements for all 1105 officers outlined in NAVPERS 15988-1. The conclusion reached was that the additional type warfare qualifications (ASW) is a logical step of professional training in the professional development system. (Author)

AD-636 268 **Field 5I**
CFSTI Prices: HC$1.00 MF$0.50
Naval Aerospace Medical Inst., Pensacola, Fla.
THE RELATIONSHIP OF FIVE PERSONALITY SCALES TO SUCCESS IN NAVAL AVIATION TRAINING.
by Howard L. Fleischman, Rosalie K. Ambler, Floyd E. Peterson, and Norman E. Lane. 24 May 66, 13p NAMI-968
NAVMED-MF022.01.02-5001.48

Descriptors: (*Naval training, Effectiveness), (*Personality, Naval training), (*Aviation personnel, Personality), Correlation techniques, Selection, Psychometrics.

Cattell's Sixteen Personality Factor Questionnaire, the Taylor Manifest Anxiety Scale, the Pensacola Z Scale, and the Adjective Check-List were evaluated as predictors of success/failure in Naval aviation training. Results showed that certain personality variables contributed significantly to multiple prediction. (Author)

LI-42:966 **Field 5I**
CFSTI Price: MF$1.25
Department of Labor, Washington, D. C.
1966 REPORT OF THE SECRETARY OF LABOR ON MANPOWER RESEARCH AND TRAINING UNDER THE MANPOWER DEVELOPMENT AND TRAINING ACT OF 1962.
1966, 223p
Availability: Hardcopy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $1.25.

Descriptors: (*Training, Manpower studies), (*Manpower studies, Training), Personnel management, Economics.

Identifiers: On-the-job training.

Contents: The institutional training program; The on-the-job training program; The experimental and demonstration program; The labor mobility demonstration program; Evaluation of the manpower development and training program; Manpower research programs; Man's motives for work; The search for work; Matching workers and jobs; Training in correctional institutions; The changing economy: Manpower implications; Estimates of future manpower requirements; International manpower research; Applications of manpower research; Program support and community involvement.

N66-16192 **Field 5I**
CFSTI Prices: HC$5.00 MF$1.00
Naval School of Aviation Medicine, Pensacola, Fla.
THOUSAND AVIATOR STUDY-METHODOLOGY.
by A. Graybiel, R. E. Mitchell, and A. Oberman. 22 Jul 65, 178p
Contract NASA Order-R-136
NASA-CR-69895

Descriptors: *Aerospace medicine, *Flight training, *Physiology, *Psychological testing.

For abstract, see T 66 17.

AD-635 595 **See Field 6S**

AD-635 614 **See Field 6N**

AD-636 270 **See Field 22A**

PB-169 928 **See Field 13B**

PB-170 382 **See Field 5B**

5J. PSYCHOLOGY (INDIVIDUAL AND GROUP BEHAVIOR)

AD-415 035 **Field 5J**
CFSTI Price: HC$1.50
Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
A BIDIRECTIONAL GRADIENT OF GENERALIZED CONDITIONED RESPONSE BASED ON A VISUAL-SPATIAL DIMENSION IN CHIMPANZEES.
Master's thesis, (final).
by Lloyd R. Chason, and William D. Thompson. Jul 63, 34p ARL-TDR-63-20
Proj. AF-6893
Tasks 689301, 689302

Descriptors: (*Conditioned reflex, Chimpanzees), (*Visual perception, Space perception), Visual signals, Reaction (Psychology), Transfer of training.

Identifiers: Generalization.

Three young chimpanzees, one male and two females, were used to investigate the generalization of chimpanzees on a visual-spatial, bidirectional dimension. The animals were conditioned to a center training light by operant conditioning techniques. The generalization gradient of response was measured by the frequency and latency of response to six non-rewarded stimuli that were identical to the training stimulus. With the training stimulus in the center, these test stimuli were arranged in the arc of a circle at the eye level of the subjects and were separated from each other by eight degrees of visual arc. The findings revealed that the animals responded to all of the peripheral test stimuli without significant difference in frequency or latency of response. However, significant decreases in response latency were observed (beyond the .01 level) on successive days of experimentation with the lowest latency occurring on the last day. It was concluded that this level of discrimination task - the level being defined by the similarity of test stimuli to the training stimuli, having been varied only on a horizontal, visual-spatial dimension by eight degrees of visual arc - might well be above the liminal discrimination ability of the chimpanzee. (Author)

AD-452 708 **Field 5J**
CFSTI Price: HC$6.00
Human Resources Research Office, George Washington Univ., Alexandria, Va.
RESEARCH ON HUMAN AERIAL OBSERVATION. PART III: SUMMARY DATA FROM TACTICAL FIELD TESTS.
Research memo.
by John A. Whittenburg, Clive Barlow, Kenneth L. Deveney, Robert D. Warne, and Alvin L. Schreiber. Jul 60, 91p
Rept. on Task OBSERVE I.

Descriptors: (*Aerial reconnaissance, Performance (Human)), (*Targets, Visual perception), Military personnel, Military training, Nuclear explosions, Identification, Detection, Mission profiles, Launching sites, Positioning reactions, Scanning, Effectiveness, Tactical warfare, Surface targets, Tactical weapons, Target acquisition, Target recognition.

The report is principally concerned with data obtained from four tactical field tests of aerial observer capabilities. It contains a brief description of the four tactical field tests, a statement of the major findings on aerial observer proficiency, and a number of tables containing summary data on observer capabilities.

AD-635 608 **Field 5J**
CFSTI Prices: HC$1.00 MF$0.50
Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
DIMENSIONS OF PEER AND SUPERVISOR RATINGS IN A MILITARY SETTING.
by Paul D. Nelson, and Newell H. Berry. May 66, 8p Rept. no. 66-1
NAVMED-MF022.01.04-9001

Descriptors: (*Naval personnel, Psychometrics), Supervisory personnel, Performance (Human), Military psychology, Perception (Psychology).

A supervisor rating on overall adjustment and peer group nominations for routine work assignments and a hypothetical combat situation were obtained on 101 male enlisted Marines who had completed two years of military service. In studying the dimensions of such evaluations, the supervisor rating appeared to reflect primarily the individual's technical competence on the job whereas the peer nominations tended to predominantly reflect the individual's technical competence on the job whereas the peer nominations tended to predominantly reflect the individual's conduct or capacity for adhering to the organization's rules and regulations. The results are relevant to the problem of developing on-the-job performance measures through use of supervisor and peer group judgments. (Author)

AD-635 693 **Field 5J, 9D, 17B**
CFSTI Prices: HC$2.00 MF$0.50
Applied Psychological Services, Wayne, Pa.
STUDIES INTO INFORMATION PRESENTATION THROUGH NOVEL METHODS. III. TWO-WAY INFORMATION TRANSFER THROUGH ELECTROCUTANEOUS TRANSDUCTION.
Phase rept.
by M. A. Fischl, Arthur I. Siegel, and Douglas H. Macpherson. Jul 66, 44p Rept. no. 10
Contract DA-28-043-AMC-00186 (E)
Proj. DA-1C0-24701-A-12!
Task 03
ECOM-00186-10
See also AD-632 735.

Descriptors: (*Information theory, *Sensory perception), Skin, Stimulation, Learning, Attention, Vocabulary, Stress (Psychology), Performance (Human), Communication systems, Applied psychology, Galvanic skin response, Psychophysiology, Electrophysiology, Time.

Identifiers: Cutaneous communication, Electrocutaneous information transfer.

After brief training in a code and orientation to the electrocutaneous transduction equipment, three two-man teams employed the code and the equipment to communicate with one another while jointly performing an experimental task. Two levels of time stress and three levels of attention sharing were imposed. Communication performance was scored as well as performance on a collateral visual monitoring task. The results indicated that: (1)reasonably precise two-way electrocutaneous information transfer had taken place, (2)communication performance was not degraded by the conditions of stress and attention-sharing, but (3) collateral task performance was degraded by stress and possibly by attention-sharing. It was concluded that the feasibility of the cutaneous sensory channel for supporting two-way information transfer in a limited vocabulary setting had been

at least partially demonstrated. Some possible applications are discussed. (Author)

AD-635 771 **Field 5J**
CFSTI Prices: HC$2.00 MF$0.50
Illinois Univ., Urbana. Group Effectiveness Research Lab.
A REVIEW OF RESEARCH ON ASo AND LPC SCORES AS MEASURES OF LEADERSHIP STYLE.
Technical rept.
by Fred E. Fiedler. May 66, 36p TR-33
Contract Nonr-1834 (36), ARPA Order-454
Proj. NR-177-472

Descriptors: (*Leadership, Psychometrics), Attitudes, Reviews, Perception (Psychology), Reliability, Social psychology, Motivation.

A review is presented of research on the reliability and validity of two interpersonal perception scores, Assumed Similarity between Opposites (ASo) and the Esteem for the Least Preferred Coworker (LPC). The review concerns itself particularly with the interpretation of these scores and presents evidence that ASo and LPC scores are indices of motivation. Individuals with high ASo and LPC scores, indicating favorable perceptions of least preferred co-workers, can be seen as seeking personal prominence and good interpersonal relations. Those with low ASo and LPC scores can be seen as seeking task success experiences. The behaviors of these two types of individuals change respectively toward greater activity in the direction of personal prominence and interaction or concern with the task as the group task situation becomes less favorable for the leader, hence more threatening to the achievement of his need satisfaction. (Author)

AD-635 784 **Field 5J**
CFSTI Prices: HC$3.00 MF$0.75
Kansas State Univ., Manhattan. Dept. of Psychology.
THE EVOLUTION OF PERCEPTUAL FRAMES OF REFERENCE.
Technical rept.
by Harry Helson, William Bevan, Lloyd Avant, W. F. Dukes, and Russell Bell. Jul 66, 70p TR-41-44
Contract Nonr-3634 (01)

Descriptors: (*Behavior, Scientific research), (*Perception (Psychology), Scientific research), Adjustment (Psychology), Background, Performance (Human), Recall, Group dynamics.

Identifiers: Stimuli (Psychology), Generalization, Reinforcement (Psychology), Frames of reference.

Contents: Stimulus generalization as a function of contextual stimuli, by H. Helson and L. L. Avant; an adaptation-level interpretation of reinforcement, by W. Bevan; Stimulus variation and recall: the role of belongingness, by W. Bevan; Operant level following a qualitative change in liquid reinforcement, by W. Bevan, R. A. Bell, and H. G. Lankford.

AD-635 865 **Field 5J**
CFSTI Prices: HC$2.00 MF$0.50
Illinois Univ., Urbana. Dept. of Psychology.
THE PREDICTION OF PERCEPTUAL-MOTOR LEARNING FROM INDEPENDENT VERBAL AND MOTOR MEASURES.
Master's thesis.
by David L. Kohfeld. Apr 66, 37p
Contract Nonr-1834 (39)
Proj. NR-151-231

Project on Techniques for Investigation of Structure of Individual Differences in Psychological Phenomena.

Descriptors: (*Learning, *Psychomotor tests), (*Verbal behavior, Psychometrics), (*Performance (Human), Psychometrics), Motor reactions, Performance tests, Behavior, Recall, Perception (Psychology), Statistical analysis, Correlation techniques.

Forty human Ss were administered independent motor and verbal pretests and were then given learning trials on a criterion task which required both motor and verbal skills. The pretests were employed as predictors to determine the relationship of verbal and motor abilities to various stages of perceptual-motor performance. The results suggest that verbal comprehension is more important early in perceptual-motor learning while motor skill is more critical in later learning. (Author)

AD-635 988 **Field 5J**
CFSTI Prices: HC$1.60 MF$0.50
Cambridge Univ. (England). Psychological Lab.
IS THE WEBER FRACTION A FUNCTION OF PHYSICAL OR PERCEIVED INPUT.
by Helen E. Ross, and R. L. Gregory. 1962, 15p
Grant AF-EOAR-61-13

Descriptors: (*Sensory perception, Weight), (*Illusions, Intensity), Thresholds (Physiology), Physical properties, Great Britain.

Identifiers: Weber fraction.

Experiments were performed concerning whether the differential threshold is affected by illusions.

AD-636 156 **Field 5J**
CFSTI Prices: HC$1.60 MF$0.50
Rochester Univ., N. Y. Dept. of Psychology.
THE EXPERIMENTAL INDUCTION OF MOOD.
Technical rept.
by George Stricker. 27 Apr 61, 20p TR-9
Contract Nonr-668 (12)
Proj. NR-171-342
See also AD-635 292, AD-635 460.

Descriptors: (*Emotions, Psychometrics), (*Motion pictures, Psychometrics), Attitudes, Factor analysis, Projective techniques, Syntax.

Identifiers: Moof (Psychology), Adjectives, TAT.

In an attempt to validate partially a multiple-choice variant of the TAT, it became necessary to induce affects consonant with the various dimensions of this test. After a review of the pertinent literature (PB-152 881), the use of films to arouse mood change was selected as an appropriate technique. The moods in question were aggression and insecurity. In order to evaluate the effectiveness of the films, there were administrations of the Adjective Check List (ACL; PB-148 900) before and after the various films were shown. In its present form the ACL consists of 40 adjectives, falling into 12 factorial clusters. Eight adjectives, four each from the aggression and anxiety clusters, were added to this list, and distributed at every fifth position, with categories alternating, throughout the form. This brought the ACL to a total of 48 adjectives. The new adjectives were added in order to increase the sensitivity of these key clusters, and brought the total number of adjectives in each of these clusters to eight. A breakdown of the adjectives into their relevant factorial clusters is given. (Author)

AD-636 226 **Field 5J**
CFSTI Prices: HC$1.00 MF$0.50
Defense Research Lab., Univ. of Texas, Austin.
PSYCHOPHYSICAL STUDIES OF HUMAN RESPONSE TO SENSORY STIMULI.
Quarterly status rept. no. 8, 1 Mar-31 May 66.
by L. A. Jeffress. 27 Jun 66, 7p
Contract Nonr-3579 (04)
NASA-R-129-09-030-017

Descriptors: (*Sensory perception, *Performance (Human)), Psychophysiology, Response, Attention, Brightness, Visual signals, Auditory signals, Color vision, Auditory perception, Visual perception, Psychoacoustics.

Contents: Method of Free Response; Psychophysical Studies of Brightness: Effects of Adaptation on the Brightness of Positive and Negative Flashes of Light; Effects of Chromatic Adaptation on Color Naming; Signal Detection and the Width of Critical Bands; Psychometric Functions for an Ear Model: Effect of Duration.

AD-636 262 **Field 5J**
CFSTI Prices: HC$1.00 MF$0.50
Bucknell Univ., Lewisburg, Pa.
HOSTILE PRESS AND INTERNAL VERSUS EXTERNAL STANDARDS OF SUCCESS AND FAILURE.
Technical rept.
by Robert I. Fischer, and Richard C. Teevan.
1966, 9p TR-19
Contract Nonr-3591 (01)
Proj. NR-171-803

Descriptors: (*Performance (Human), Psychometrics), Perception (Psychology), Social psychology, Effectiveness, Standards, Motivation, Fear.

The Ss were 44 male Bucknell University students enrolled in an introductory psychology class. A true-false questionnaire was used to determine whether the Ss conceptualized success and failure in terms of internal or external evaluative criteria. Because of the extreme external orientation of the 'fear of failure' (FF) individual (defined in terms of the Hostile Press scoring system of the TAT) in an achievement situation, it was hypothesized that the FF individual would conceptualize success and failure in terms of external rather than internal evaluative criteria. The results supported the hypothesis. (Author)

N66-15394 **Field 5J**
CFSTI Prices: HC$3.00 MF$0.50
Institute for Behavioral Research, Inc., College Park, Md.
EXPERIMENTAL STUDIES OF PERCEPTUAL PROCESSES. SECTION TWO.
Progress rept. Jan-30 Sep 65.
by C. B. Ferster, C. Hammer, and J. Randolph.
Sep 65, 54p
Grant NsG-450
NASA-CR-69356

Descriptors: *Animal performance, *Behavior, *Reinforcement.

For abstract, see T 66 17.

N66-15395 **Field 5J**
CFSTI Prices: HC$3.00 MF$0.75
Institute for Behavioral Research, Inc., College Park, Md.
EXPERIMENTAL STUDIES OF PERCEPTUAL PROCESSES, SECTION THREE.
Progress rept. 1 Jan-30 Sep 65.
by I. Goldiamond, A. Miller, S. Pliskoff, J. Quagliano, and A. Stubbs. Sep 65, 87p
Grant NsG-450
NASA-CR-69357

Descriptors: *Signal detection, *Behavior, *Psychophysics.

N66-15579 **Field 5J**
CFSTI Prices: HC$1.00 MF$0.50
Baylor Univ., Houston, Tex. College of Medicine.
AUDITORY MASKING. A STUDY OF ITS PHYSIOLOGICAL MECHANISM AND OF CORRE-

LATIONS BETWEEN PHYSIOLOGICAL AND PSYCHOLOGICAL OBSERVATIONS.
Quarterly progress rept. no. 1, 30 Jun 65.
by A. C. Coats, and P. Kellaway. 1965, 20p
Grant NsG-390
NASA-CR-69426

Descriptors: *Physiological effect, *Psychological testing, *Auditory stimulus.

PB-170 878 **Field 5J**
CFSTI Prices: HC$3.00 MF$0.75
Stanford Research Inst., Menlo Park, Calif.
THE VALUE OF TIME FOR PASSENGER CARS: A BEHAVIORAL STUDY OF DRIVER ROUTE CHOICE.
by Peter D. Fox, May 65, 90p 0490
Contracts CPR-11-0959, CPR-11-8028
Projs. SRI-MU-4393, SRI-MU-5074
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Motor vehicle operators, Decision making), Passenger vehicles, Time, Roads, Traffic, Behavior.

The report formulates and evaluates models that are designed to predict and explain driver route choice. A major portion of the report focuses on the step model. This model assumes that the driver considers the variables that are relevant to his choice sequentially, rather than attempting to evaluate them simultaneously. The driver looks at as many variables, each in its turn, as are necessary to eliminate from further consideration all but one route, the route that the model predicts the driver will take. Data were obtained on 171 employees of the Stanford Research Institute; such items as travel time, distance, number of turns, stops, and traffic signals were studied, including actual driving of the routes. Conclusions: (a) Route choice was not influenced by relative distance, independent of time, (b) stop and go travel time is evaluated differently from constant speed time, (c) drivers do consciously vary their routes on work trips, men more so than women, and (d) travel time to and from work was overestimated by 2.54 minutes and the distance was underestimated by 0.19 miles. (Author)

PB-170 879 **Field 5J**
CFSTI Prices: HC$5.00 MF$1.00
Bolt, Beranek and Newman, Inc., Cambridge, Mass.
AN INVESTIGATION OF AUTOMOBILE DRIVER INFORMATION PROCESSING.
Final rept.
by J. W. Senders, A. B. Kristofferson, W. Levison, C. W. Dietrich, and J. L. Ward. 26 Apr 66, 164p
Rept. no. 1335, 0497
Contract CPR-11-0958
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Motor vehicle operators, Attention), Traffic, Reaction (Psychology), Roads, Behavior, Vision, Velocity.

The report is concerned with the development of a method of measuring the driver's attentional demand. A visor-shutter device was constructed, whose light-dark ratio could be controlled and varied. Under mild traffic conditions, the driver would be expected to tolerate a relatively long dark interval; under heavy traffic, he would tolerate no interruption of his view of the road. The device was validated by determining the longest dark interval which would be tolerated, when the car travelled at various speeds on a straight section of Interstate, and on a curved track. A formula was developed to explain the factors influencing attentional demand. (Author)

AD-277 439 **See Field 6S**

AD-635 602 **See Field 5I**

AD-635 617 **See Field 5I**

AD-635 737 **See Field 6E**

AD-635 986 **See Field 6P**

AD-635 987 **See Field 6P**

AD-636 057 **See Field 5K**

AD-636 059 **See Field 6C**

AD-636 175 **See Field 5A**

AD-636 213 **See Field 5I**

5K. SOCIOLOGY

AD-430 728 **Field 5K, 5D, 5C, 15C**
CFSTI Price: HC$10.50
Special Operations Research Office, American Univ., Washington, D. C.
U. S. ARMY AREA HANDBOOK FOR BOLIVIA.
Aug 63, 707p

Descriptors: (*Bolivia, Handbooks), Sociology, History, Economics, Political science, National defense, Police, Religion, Education, Foreign policy, Agriculture, Industries, Labor, Public health, Armed forces (Foreign), Population.

The book is one of a series of country handbooks designed for use by persons who have need for such background information. The emphasis is an objective description of contemporary national societies, focusing on basic social, economic and political institutions. Treatment is intended to be comprehensive rather than exhaustive.

AD-441 230 **Field 5K**
CFSTI Price: HC$6.00
RAND Corp., Santa Monica, Calif.
THE MAJOR ETHNIC GROUPS OF THE SOUTH VIETNAMESE HIGHLANDS.
by Gerald C. Hickey. Apr 64, 79p RM-4041-ARPA
ARPA Order-189-61

Descriptors: (*Vietnam, Anthropology), (*Anthropology, Vietnam), Culture, Economics, Political science, Religion, Sociology, History.

Contents: The highlanders' common background and pattern of life; History of the area and characteristic features of the major highland groups.

AD-636 057 **Field 5K, 5A, 5J**
CFSTI Prices: HC$2.00 MF$0.50
Hawaii Univ., Honolulu. East-West Center for Cultural Exchange.
SOME METHODOLOGICAL PROBLEMS IN CROSS-CULTURAL RESEARCH.
Technical rept.
by F. K. Berrien. Apr 66, 27p TR-1
Contract Nonr-4806 (00)

Descriptors: (*Culture, *Research program administration), Data, Sociometrics, Social psychology, Attitudes, Japan, United States.

Four central methodological problems in cross-cultural research are discussed: (a) the comparability of samples, (b) ethnic impact on the definition of researchable problems, (c) the comparability of research instruments, and (d) the cultural bounds on data interpretations. The article deliberately poses the problems without prescribing research designs but suggests some alternative approaches to their short-run resolution. (Author)

AD-636 104 **Field 5K**
CFSTI Prices: HC$1.60 MF$0.50
RAND Corp., Santa Monica, Calif.
AN OUTSIDER SURVEYS THE PLACE OF PUBLIC ADMINISTRATION RESEARCH.
by F. S. Pardee. 20 Jul 59, 11p P-1756

Descriptors: (*Sociology, Management planning), Social psychology, Leadership, Motivation, Education, Textbooks, Political science, Scientific research, Reaction (Psychology), Decision making.

An inquiry is made into the research essential for imparting to mankind an intuitive common sense, for providing a substitute for experience, i.e. a placement in context, and a visualization, of an actual event prior to its occurrence. This will be essential because of the need to deal with a more integrated populace or socialized economy, a more technically oriented world, and a more rapidly moving way of life. Four general fields are suggested for study (1) improvement and expansion of the breadth of techniques and tools of management and administration, (2) further investigation of the art of leadership and followership including such subjects as communication, motivation phenomena, and mass psychology, (3) organization of a simplified comprehensible body of information on the impact of probable advancement in the physical sciences, and, (4) more complete codification of political theory and the history of political thought. Implications are given for the development of informed human beings capable of coping with life during the remainder of this century.

PB-170 771 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. HAWAII, VERMONT, RHODE ISLAND, DELAWARE, IDAHO, MONTANA, COLORADO, SOUTH DAKOTA, NEBRASKA, ARKANSAS.
Magnetic tape with record layout.
1960,
Reel-1 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manuals see AD-631 762, AD-631 756, AD-631 757, AD-631 763, AD-631 761 and AD-631 760.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment geography, Hawaii, Vermont, Rhode Island, Delaware, Idaho, Montana, Colorado, South Dakota, Nebraska, Arkansas.

Information is given on magnetic tape for each Standard Location Area in a format that lists each item of information together with its location. The record lists such information as the family relationship within a household, the school enrollment of the children, income, employment status, the numbers of personnel employed by industry and in agriculture, tenancy and vacancy status of housing units, value of property, the heating fuels used, and the numbers of workers classified according to type of work.

PB-170 772 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. LOUISIANA, NORTH CAROLINA, INDIANA.
Magnetic tape with record layout.
1960,
Reel-2 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manuals see AD-631 760, AD-631 758 and AD-631 759.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, Louisiana, North Carolina, Indiana.

For abstract, see T 66 17.

PB-170 773 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. MINNESOTA, MISSISSIPPI, SOUTH CAROLINA, OKLAHOMA, DISTRICT OF COLUMBIA.
Magnetic tape with record layout.
1960,
Reel-3 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 171 through PB-170 787. For related manuals see AD-631 757, AD-631 758, AD-631 759 and AD-631 760.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, Minnesota, Mississippi, South Carolina, Oklahoma, District of Columbia.

PB-170 774 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. OHIO.
Magnetic tape with record layout.
1960,
Reel-4 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manual see AD-631 757.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, Ohio.

PB-170 775 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. NEVADA, WASHINGTON.
Magnetic tape with record layout.
1960,
Reel-4A of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manuals see AD-631 762 and AD-631 763.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, Nevada, Washington.

PB-170 776 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. MICHIGAN, WISCONSIN.
Magnetic tape with record layout.
1960,
Reel-5 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manual see AD-631 759.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, Michigan, Wisconsin.

PB-170 777 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. PENNSYLVANIA.
Magnetic tape with record layout.
1960,
Reel-6 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manual see AD-631 757.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, Pennsylvania.

PB-170 778 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. ALASKA, OREGON, WEST VIRGINIA, ALABAMA, FLORIDA.
Magnetic tape with record layout.
1960,
Reel-7 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manuals see AD-631 757, AD-631 758 and AD-631 763.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, Alaska, Oregon, West Virginia, Alabama, Florida.

PB-170 779 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. IOWA, MARYLAND, KANSAS, MAINE, NORTH DAKOTA, NEW MEXICO, WYOMING.
Magnetic tape with record layout.
1960,
Reel-8 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manuals see AD-631 756, AD-631 757, AD-631 760 and AD-631 761.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, Iowa, Maryland, Kansas, Maine, North Dakota, New Mexico, Wyoming.

PB-170 780 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. TEXAS, CONNECTICUT.
Magnetic tape with record layout.
1960,
Reel-9 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manuals see AD-631 756 and AD-631 760.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, Texas, Connecticut.

PB-170 781 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. VIRGINIA, TENNESSEE, KENTUCKY, ARIZONA.
Magnetic tape with record layout.
1960,
Reel-10 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manuals see AD-631 757, AD-631 758 and AD-631 762.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, Virginia, Tennessee, Kentucky, Arizona.

PB-170 782 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. MISSOURI, UTAH, NEW HAMPSHIRE, NEW JERSEY.
Magnetic tape with record layout.
1960,
Reel-11 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manuals see AD-631 756, AD-631 761 and AD-631 762.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, Missouri, Utah, New Hampshire, New Jersey.

PB-170 783 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. GEORGIA, MASSACHUSETTS.
Magnetic tape with record layout.
1960,
Reel-12 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manuals see AD-631 756 and AD-631 758.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, Georgia, Massachusetts.

PB-170 784 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. ILLINOIS.
Magnetic tape with record layout.
1960,
Reel-13 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manual see AD-631 759.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, Illinois.

PB-170 785 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. NEW YORK (PART I).
Magnetic tape with record layout.
1960,
Reel-14 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manual see AD-631 756. See also PB-170 787.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, New York.

PB-170 786 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. CALIFORNIA (PART I).
Magnetic tape with record layout.
1960,
Reel-15 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manuals see AD-631 762. See also PB-170 787.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, California.

PB-170 787 **Field 5K, 5C, 8F**
CFSTI Price: $100.00
Bureau of the Census, Washington, D. C.
POPULATION AND HOUSING DATA FOR THE UNITED STATES BY STANDARD LOCATION AREAS, 1960 CENSUS. NEW YORK (PART II), CALIFORNIA (PART II).
Magnetic tape with record layout.
1960,
Reel-16 of 17 reels of magnetic tape, each priced at $100.00 per reel, PB-170 771 through PB-170 787. For related manuals see AD-631 756 and AD-631 762. See also PB-170 785 and PB-170 786.

Descriptors: (*Population, United States), (*Housing, United States), Urban areas, Rural areas, Employment, Geography, New York, California.

AD-635 885 **See Field 5I**

6A. BIOCHEMISTRY

AD-635 623 **Field 6A, 6P**
CFSTI Prices: HC$1.00 MF$0.50
John B. Pierce Foundation of Connecticut, New Haven.
OXYGEN TRANSPORT THROUGH HEMOGLOBIN SOLUTIONS.
Final rept., Mar 63-Mar 65.
by Harold T. Hammel. Feb 66, 25p
Contract AF 33 (657)-11103
Proj. AF-7164
Task 716409
AMRL-TR-66-19

Descriptors: (*Hemoglobin, Oxygen), (*Oxygen, Transport properties), Solutions, Diffusion, Nitrogen, Membranes, Films, Dissociation.

Scholander discovered that the steady state flux of oxygen through a thin film of water could be enhanced many times by adding hemoglobin to the water. Several authors have ascribed this facilitated flux of oxygen to the diffusion of oxyhemoglobin down its gradient although the details of their formulations have not been rigorously supported by experimental evidence. A series of measurements of oxygen and nitrogen flux through a film of hemoglobin solution were made for which the pO2 and pN2 on one side were always 16.5 and 62.5 mm Hg respectively while the pO2 on the other side was increased from 0.5 to 14 mm Hg by adding increasing thicknesses of teflon film to this side. When the facilitated oxygen flux was small, it was found to equal the calculated flux assuming that the oxygen was carried by the diffusing oxyhemoglobin and that Henry's law and the equilibrium dissociation curve for oxyhemoglobin apply at the two surfaces of the hemoglobin film. When the facilitated oxygen flux was greatest, it was found to be only one half the calculated flux, presumably because the pO2 on the solution side of the gas-solution interface was considerably less than the 16.5 mmHg prevailing on the gas side. (Author)

AD-635 886 **Field 6A**
CFSTI Prices: HC$4.00 MF$1.00
RAND Corp., Santa Monica, Calif.
THE CLASSICAL STRUCTURE OF BLOOD BIOCHEMISTRY-A MATHEMATICAL MODEL.
by E. C. DeLand. Jul 66, 134p RM-4962-PR
Contract AF 49 (638)-1700

Descriptors: (*Blood chemistry, Mathematical models), Blood proteins, Electrolytes (Physiology), Acid-base equilibrium, Semipermeability, Membranes (Biology), Erythrocytes, Hemoglobin, Osmosis, Respiration, Serum albumin, Globulins, Blood plasma, Stress (Physiology), pH, Electrophysiology, Biochemistry, Blood.

Identifiers: Ion transport.

The mathematical simulation of human blood biochemistry includes the results of detailed chemical analysis of human blood under a variety of chemical stresses. Mathematical simulations of increasing degrees of complexity are developed. A rudimentary blood model assumes the conventional roles of the fixed proteins, the neutral electrostatic charge constraints, and the active cation pump as the major characteristics of hemostatic blood. The microscopic properties of the proteins, particularly their buffering behavior, are incorporated into the model by a mathematical procedure that assumes that the serum albumin and the various globulins represent all of the important buffering power of the plasma fraction. A model of the respiratory biochemistry of the blood, embodying the results of the previous biochemical structural detail, is tested under various conditions. Properties of the mathematical model, such as gas exchange, buffering, and response to chemical stress in the steady state, are practically indistinguishable from those properties of real blood within the limits of the present validation program. (Author)

AD-635 980 **Field 6A**
CFSTI Prices: HC$2.60 MF$0.50
Sheffield Univ. (England). Dept. of Biochemistry.
THE COMBINATION OF PORPHYRINS WITH NATIVE HUMAN GLOBIN.
by Quentin H. Gibson. 1961, 26p
Grant AF-EOAR-61-2

Descriptors: (*Porphyrins, *Proteins (Simple)), Reaction kinetics, Absorption spectrum, Fluorescence, Temperature, Equilibrium, pH, Iron, Hemoglobin, Great Britain.

The changes in absorbancy and fluorescence yield when porphyrins and native globin react are closely correlated. Quantitative examination of these changes shows that they are due to the breakdown of porphyrin dimers. The rates of reaction of proto, meso and hematoporphyrins with native globin have been measured. They are in the order proto>meso >hemato. The rates for the porphyrins are closely similar to those for the corresponding CO-hemes. Thus the iron does not influence the rate of binding of heme to globin. (Author)

AD-635 984 **Field 6A, 6E**
CFSTI Prices: HC$2.60 MF$0.50
Liege Univ. (Belgium). Institut de Therapeutique Experimentale.
INVESTIGATION OF TOOTH AND BONE STRUCTURE.
Technical rept.
by M. J. Dallemagne. 30 Jun 63, 27p
Grant AF-EOAR-61-26

Descriptors: (*Teeth, Chemical analysis), (*Bone, Chemical analysis), Phosphates, Calcium compounds, Carbonates, Infrared spectroscopy, Calcification, Spectra (Infrared), Dentistry, Rabbits, Belgium.

Work was performed on the mineral phase of dentine and enamel of rabbit teeth, particularly interesting in view of their low Ca/P ratio. Within the same conceptual approach to the structure of the mineral phase in calcified tissues, namely the existence of specific deviations from the hydroxyapatite model, the problem of the carbonate fraction in natural and biological apatites was studied. A systematic study of these compounds was initiated, based mainly on infrared absorption spectrophotometry. The report concerns two specific points: the chemical composition of rabbit teeth and the carbonate fraction of natural and biological apatites.

AD-635 985 **Field 6A, 6E**
CFSTI Prices: HC$1.10 MF$0.50
Liege Univ. (Belgium). Institut de Therapeutique Experimentale.
INVESTIGATION OF TOOTH AND BONE STRUCTURE.
Technical rept.
by M. J. Dallemagne. 1 Oct 62, 9p
Grant AF-EOAR-61-26

Descriptors: (*Teeth, Chemical analysis), (*Bone, Chemical analysis), Calcium compounds, Carbonates, Phosphates, Infrared spectroscopy, Calcification, X-ray diffraction analysis, Dentistry, Rats, Belgium.

For abstract, see T 66 17.

AD-635 992 **Field 6A**
CFSTI Prices: HC$1.10 MF$0.50
Sheffield Univ. (England). Dept. of Biochemistry.
FINAL REPORT.
1962, 4p
Grant AF-EOAR-61-2

Descriptors: (*Luminescence, *Anthoxanthin pigments), Nucleotides, Oxidation, Reaction kinetics, Enzymes, Great Britain.

Identifiers: Bioluminescence, Luciferins.

Kinetic studies on a bioluminescent system, involving reduced flavin mononucleotide as a luciferin, are briefly summarized. A detailed report was published in Biochemical Journal v83 p368 1962 (AD-636 060).

N66-15396 **Field 6A**
CFSTI Prices: HC$2.00 MF$0.50
Institute for Behavioral Research, Inc., Silver Spring, Md.
EXPERIMENTAL STUDIES OF PERCEPTUAL PROCESSES, SECTION FOUR.
Progress rept. 1 Jan-30 Nov 65.
by I. Goldiamond, R. G. Grenell, A. Stubbs, and J. Thomas. Sep 65, 47p
Grant NsG-450
NASA-CR-69358

Descriptors: *Animal performance, *Electrophoresis, *Ribonucleic acid, *Behavior.

For abstract, see T 66 17.

N66-17218 **Field 6A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
THE ANOMERIC SPECIFICITY OF YEAST GALACTOKINASE.
by M. R. Heinrich, and S. M. Howard. 1964, 25p
NASA-TM-X-56057
Grant NSF-GA-5096

Descriptors: *Enzyme, *Chromatography, *Galactokinase, *Yeast.

AD-635 898 **See Field 7C**

AD-635 955 **See Field 6P**

AD-636 058 **See Field 6C**

PB-170 793 **See Field 5B**

PB-170 794 **See Field 5B**

6B. BIOENGINEERING

N66-12198 **Field 6B**
CFSTI Prices: HC$1.00 MF$0.50
Chicago Univ., Ill. Dept. of Biophysics.
ELECTRON MICROSCOPIC AND BIOCHEMICAL CHARACTERIZATION OF FRACTION I PROTEIN.
by H. Fernandez-Moran, R. Haselkorn, F. J. Kieras, and E. F. J. Van Bruggen. 1965, 17p
Grant NsG-441-63
NASA-CR-68099

Descriptors: *Electron microscopy, *Plant (BIOL), *Protein metabolism.

N66-18068 Field 6B
CFSTI Prices: HC$2.00 MF$0.50
Spacelabs, Inc., Van Nuys, Calif.
BIO-GRID SYSTEM.
Final rept.
by C. H. Stroud. 31 May 65, 30p SR-65-1020
Contract NAS4-566
NASA-CR-70532

Descriptors: *Bioinstrumentation, *Body measurement (Biol), *Skin resistance, *Electrodermal response.

6C. BIOLOGY

AD-635 613 Field 6C
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
CARDIAC OUTPUT AND REGIONAL BLOOD FLOW IN THE ANESTHETIZED BABOON.
by William P. Fife. May 66, 12p SAM-TR-66-50
Proj. AF-7758
Prepared for presentation at the International Symposium on the Baboon and Its Use as an Experimental Animal (2nd), Southwest Foundation for Research and Education, San Antonio, Tex., 2 November 1965.

Descriptors: (*Blood circulation, *Primates), Cardiovascular system, Radioactive isotopes, Tracer studies, Heart, Capillaries, Tissues (Biology), Brain, Fluid flow, Humans, Dogs.

Identifiers: Baboons.

Cardiac output and regional blood flow measurements were made in 9 normal, anesthetized, adult baboons by the use of radioactive tracers. Essentially, the method consists of rapidly introducing a solution of rubidium (Rb86) chloride into a femoral vein while serially sampling blood flow at the femoral artery. Thirty seconds after the injection of the radioactivity, the animal is sacrificed by the rapid injection of 10 cc. Lethol. This results in the production of a dye dilution curve which, by the employment of a modified Fick equation, provides the measurement of the cardiac output over the sampling period. It also results in the deposition of radioactive rubidium in the capillary beds of all tissues except the brain in direct proportion to the blood flow to that organ over the same time period. From this information, the percent of cardiac output to each tissue bed may be determined and, when calculated on the basis of the cardiac output over the same period of time, actual blood flow in centimeters per minute may be obtained. By this technic, blood flow to the following tissues was obtained: heart, lungs, liver, gut, spleen, stomach, adrenals, kidneys, thyroid, omentum, skin, and skeletal muscle and bone. These data are compared with similar data for the dog and man. (Author)

AD-635 663 Field 6C
CFSTI Prices: HC$1.00 MF$0.50
Stockholm Univ. (Sweden). Dept. of Zoology.
PHYLOGENETICAL ADAPTATION AND ADAPTIVE MODIFICATION IN THE BEHAVIOUR OF THE BEAVER (CASTOR FIBER L.). APPENDIX III.
Final technical rept.
by Lars Wilsson. 30 Nov 63, 8p
Grant AF-EOAR-62-12

Descriptors: (*Rodents, Behavior), Aquatic animals, Genetics, Learning, Adaptation (Physiology), Environment, Motor reactions.

Identifiers: Beavers.

For abstract, see T 66 17.

AD-635 679 Field 6C
CFSTI Prices: HC$1.00 MF$0.50
Oxford Univ. (England). Inst. of Experimental Psychology.
NEURAL MECHANISMS, EVOLUTION, GENETICS AND BEHAVIOUR IN CERTAIN DIPTERA.
Technical rept.
by Stella A. Crossley. 1 Mar 64, 14p TR-1
Grant AF-EOAR-62-49

Descriptors: (*Drosophila, Reproduction (Physiology)), (*Behaviour, Central nervous system), (*Central nervous system, Drosophila), Genetics, Mutations, Sex, Motivation, Stimulation, Anatomy, Histology, Electrophysiology.

The courtship behaviour of Drosophila funebris is described. A map showing the main regions of the brain of this fly is given and the electrophysiological method used to investigate the nervous control of the behaviour of this species is described. The way in which this method will be used in future experiments to study the effects of genetic changes in the nervous system is outlined. (Author)

AD-635 770 Field 6C
CFSTI Prices: HC$6.00 MF$0.50
Cambridge Univ. (England). Zoological Lab.
BIOLOGICAL CLOCKS AND THEIR INTERACTIONS IN INSECTS.
Final scientific rept.
by Janet Harker. 1 Nov 65, 42p
Grant AF-EOAR-14-64
Proj. AF-9777
Task 977701
AFOSR-66-1478

Descriptors: (*Rhythm (Biology), Insects), (*Blattidae, Rhythm (Biology)), (*Drosophila, Rhythm (Biology)), Nerve cells, Esophagus, Ganglia, Secretion, Motion, Tissue extracts, Biological assay, Nervous system, Light, Histology, Great Britain.

The research described falls into four sections: (a) Histological investigations into the activity of the neurosecretory cells in the cockroach suboesophageal ganglion show that no clear changes occur in the stainable secretory material in these cells to parallel the animal's circadian locomotor activity cycle. The nuclei of some of these cells showed a possible circadian cycle of change in volume. (b) A method of bioassaying pharmacologically active extracts of cockroach tissues was set up. After initial trials it was considered that the necessary further development of the apparatus was not warranted. (c) Operations on the nervous system of cockroaches confirmed that the clock mechanism controlling the activity cycle could function without direct nervous connection between the sub-oesophageal ganglion and the corpora cardiaca. (d) The rate of development of Drosophila pupae is affected by factors following a circadian rhythm. The form of the rhythm is determined by both light-on and light-off signals, but the timing of the rhythm is determined by the two signals acting independently of each other. The circadian rhythm of eclosion of Drosophila cultures is shown to be the result of the summation of different individual rhythms of development at earlier stages. (Author)

AD-635 981 Field 6C
CFSTI Prices: HC$1.10 MF$0.50
Oxford Univ. (England). Inst. of Experimental Psychology.
BRAIN STEM STIMULATION AND ETHOLOGICAL STUDIES ON BIRDS.
Final rept., 1 Oct 61-30 Nov 62.
by N. Tinbergen, D. M. Vowles, and J. D. Delius. 30 Nov 62, 6p
Grant AF-EOAR-61-11

Descriptors: (*Birds, *Brain), Stimulation, Electrophysiology, Behavior, Great Britain.

For abstract, see T 66 17.

AD-636 058 Field 6C, 6A
CFSTI Prices: HC$1.00 MF$0.50
Bari Univ. (Italy). Inst. of Zoology and Comparative Anatomy.
RESEARCH OF THE BENTHIC FAUNA OF THE SOUTHERN ADRIATIC ITALIAN COAST.
Final rept., 15 Jun 65-15 Jun 66.
by Michele Sara. 15 Jun 66, 15p
Grant Nonr (G)-00074-65
Proj. NR-104 734

Descriptors: (*Marine biology, Adriatic Sea), (*Sponges, Adriatic Sea), Italy, Animals.

A research on the benthic fauna of Puglie's littoral in the South Adriatic Sea, the first in this area, has been initiated and is carried out through diving and dredging. Various stations and different biotopes have been investigated along about 400 km of coast, at depths ranging from 0 to 50 m. The distribution of Sponges has been studied quantitatively and qualitatively, both in the habitats of shallow water (from the sunny phytal to the dark grottoes) and in those of the circalittoral coralligenous platform, between 10 and 50 m. The number of Sponge species (more than one hundred)is considerable also in superficial waters, in relation with the general northern exposition of that coast. The number of species of Clionids, which are represented by nearly all the species recorded from the Mediterranean, and their abundance, is very high, this in connection with the calcareous nature of the rocky bottom. The boring Clionids have certainly a primary role in the degradation of Puglie's littoral. Another peculiar feature of the benthic communities of this zone is the low depth, 20 metres, and even less, at which they begin to constitute a circalittoral coralligenous platform. (Author)

AD-636 059 Field 6C, 5J
CFSTI Prices: HC$1.00 MF$0.50
Oxford Univ. (England). Inst. of Experimental Psychology.
NEURAL MECHANISMS, EVOLUTION, GENETICS AND BEHAVIOUR IN CERTAIN DIPTERA.
Final scientific rept.
by Stella A. Crossley. 1 Jun 66, 14p
Grant AF-EOAR-62-49
AFOSR-66-1477

Descriptors: (*Genetics, Drosophila), (*Drosophila, Reproduction (Physiology)), (*Behavior, Drosophila), Nervous system, Electrophysiology, Mutations, Brain, Recording systems, Stimulation, Anatomy, Histology, Diptera, Great Britain.

The courtship behaviour of Drosophila funebris and of Drosophila melanogaster mutant ebony is described. A method of recording from the brain of these insects is developed. This method resulted in providing additional information concerning the effect of the gene ebony on behaviour. (Author)

N66-14638 Field 6C
CFSTI Prices: HC$4.00 MF$0.75
Maryland Univ., College Park.
CHLORELLA, PHYSIOLOGY AND TAXONOMY OF FORTY-ONE ISOLATES.
by R. W. Krauss, and I. Shihira. 1965, 106p
Grant NsG-70
NASA-CR-69107

Descriptors: *Chlorella, *Morphology, *Physiology.

For abstract, see T 66 17.

N66-18147 Field 6C
CFSTI Prices: HC$1.00 MF$0.50
Cekmece Nuclear Research Center, Istanbul (Turkey).
DISCUSSION ON THE POSSIBILITIES OF PRODUCING MUTANTS RESISTANT TO PERONOSPORA TABACINA (BLUE MOLD DISEASE) OF TOBACCO PLANTS BY SEED TREATMENT WITH IONIZING RADIATION.
by E. Polar. Nov 64, 22p CNAEM-18

Descriptors: *Genetics, *Ionizing radiation, *Mutation, *Tobacco.

PB-170 582 **Field 6C, 2D, 4B**
CFSTI Prices: HC$3.00 MF$0.50
Weather Bureau, Tifton, Ga.
WEATHER AND PLANT DISEASES: A REVIEW.
Agricultural Meteorology rept.
by Vincent J. Valli. Mar 66, 28p
WB-TN-36-AGMET-3

Descriptors: (*Plants (Botany), Diseases), (*Meteorological parameters, Plants (Botany)), Reviews, Agriculture, Ecology, Fungi, Bacteria, Viruses, Nematodes.

Weather, insects and plant diseases are the three major national hazards to crop production. For a plant disease to occur, a susceptible plant must be in a vulnerable stage, the pathogen must be in an infectious stage, and environmental conditions must be favorable for disease development. The primary environmental conditions that affect the plant - pathogen relationship are temperature, humidity, light, and wind. Descriptions of weather influences on diseases caused by fungi, bacteria, and viruses are given. The influence of weather on nematodes is also discussed. Details of plant disease forecasting for potato blight (Phytophthora infestans), apple scab (Venturia inaequalis), pecan scab (Fuscladium effusum), tobacco blue mold (Peronospora tobacina) and downy mildew of lima beans (Phytophthora phaseoli) are given, together with sample forecasts. (Author)

AD-635 559 **See Field 6R**

AD-635 661 **See Field 6R**

AD-635 662 **See Field 6R**

AD-635 952 **See Field 6M**

AD-636 119 **See Field 8A**

6D. BIONICS

AD-635 576 **Field 6D**
CFSTI Prices: HC$6.00 MF$0.50
RAND Corp., Santa Monica, Calif.
THE STATUS OF AND DEVELOPMENT PROSPECTS FOR SCIENTIFIC RESEARCH IN CYBERNETICS AT THE ACADEMY OF SCIENCES OF THE UKRAINIAN SSR.
12 Jul 66, 11p LT-66-30
TT-66-61779
Trans. of Akademiya Nauk URSR, Kiev. Dopovidi, n1 p129-32 1966.

Descriptors: (*Cybernetics, *Research program administration), Scientific research, USSR.

For abstract, see T 66 17.

AD-635 580 **Field 6D, 6P**
CFSTI Prices: HC$3.00 MF$0.75
Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
A MODEL FOR FIRING PATTERNS OF AUDITORY NERVE FIBERS.
Doctoral thesis (Techanical).
by Thomas F. Weiss. 2 Mar 64, 97p TR-418
Contract DA-36-039-AMC-03200 (E), Grant DA-SIG-36-039-61-G14
Supported in part by Grants NSF-G-16526 and PHS-MH-04737-03.

Descriptors: (*Auditory perception, Models (Simulations)), (*Nerve fibers, Bionics), (*Nerve impulses, Auditory perception), Electrophysiology, Auditory signals, Stimulation, Ear, Vestibular apparatus, Sensory mechanisms, Transducers, Circuits, Digital computers.

Recent electrophysiological data obtained from auditory nerve fibers of cats have made possible the formulation of a model of the peripheral auditory system. This model relates the all-or-none activity of these fibers to acoustic stimuli. The constituents of the model are intended to represent the major functional constituents of the peripheral system. These constituents are: (i)a linear mechanical system intended to represent the outer, middle, and the mechanical part of the inner ear; (ii) a transducer intended to represent the action of the sensory cells; and (iii)a model neuron intended to represent the nerve excitation process. A general-purpose digital computer was used to determine the response of the model to a variety of acoustic stimuli. These results were compared with data obtained from auditory nerve fibers. (Author)

PB-170 425 **Field 6D, 6E**
CFSTI Prices: HC$1.50 MF$0.50
Brooks Research, Inc., East Rochester, N. Y.
A METHOD OF PATTERN RECOGNITION AND ITS APPLICATION TO BIOMEDICAL PROBLEMS.
by Kurt Enslein. 1962, 5p
COMMUNICATOR: Rochester Section v2 (S8) p18-22 Sep 62. NSF Scientific Documentation Proj.

Descriptors: (*Pattern recognition, Physiology), (*Physiology, Pattern recognition), Diagnosis, Thorax, X rays, Electrophoresis, Heart, Sounds.

Identifiers: Perceptrons.

For abstract, see T 66 17.

AD-635 809 **See Field 9D**

AD-635 876 **See Field 15G**

AD-635 898 **See Field 7C**

6E. CLINICAL MEDICINE

AD-635 561 **Field 6E**
CFSTI Prices: HC$1.60 MF$0.50
Naval Medical Research Inst., Bethesda, Md.
DIFFERENTIAL CARDIAC HYPOTHERMIA FOR ELECTIVE CARDIOPLEGIA.
Research rept., vol. 18, p53-64.
by Harold C. Urschel Jr, and Jack J. Greenberg.
4 May 60, 12p
NAVMED-MR-005.12-0002.04-3

Descriptors: (*Heart, Surgical techniques), (*Hypothermia, Heart), Surgery, Cardiovascular system, Blood circulation, Blood pressure, Histology, Lungs, Dextran, Electrolytes (Physiology), Acidosis, Arrhythmia.

Identifiers: Extracorporeal circulation.

Rapid hypothermia applied locally to the heart effects an excellent cardioplegia while simultaneously protecting the organ from anoxia. The remainder of the body is maintained at mild hypothermic levels with extracorporeal circulation, thereby avoiding the disadvantages of deep generalized hypothermia to levels necessary for cardiac arrest. No addition or extraction of chemical agents is necessary. Cardiac temperatures below 16C. provided successful and safe cardiac arrest in 52 dogs. Two different methods were investigated. One employed intermittent coronary perfusion with 2C. fluid and external local application of 2C. saline to the heart. The other, a modification for aortic valve surgery, utilized lavage with external cold saline with only initial perfusion of the coronary arteries. Both provided operative arrest in less than one minute, easy maintenance for periods from 30 to 120 minutes, and rapid re-establishment of regular sinus rhythm and normal blood pressure in every animal. The technique allowed uninterrupted surgery for the entire period of cardiac arrest. Eighty-five percent of the animals survived longer than two days postoperatively. Histological examination of the hearts and lungs revealed no significant tissue damage. For perfusion at lower temperatures Ringer's solution proved superior to blood, 50 percent blood-saline mixture, or dextran, because of its lower viscosity, physiological electrolyte content, and commercial availability. Electrolyte determinations of coronary sinus blood post arrest revealed a significant decrease in serum potassium and calcium, with maintenance of normal sodium and magnesium concentrations as compared with pre-arrest samples. Ventricular fibrillation occurred in a large percentage of the cases, but all were easily defibrillated. Acidosis secondary to infusion of large quantities of citrated blood postoperatively produced occasional cardiac arrhythmia and is to be avoided. Clinical application of these techniques is presented. (Author)

AD-635 610 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
A FORMULA FOR HUMAN PAROTID FLUID COLLECTED WITHOUT EXOGENEOUS STIMULATION.
Rept. for Jan 61-Jan 66.
by Ira. L. Shannon. May 66, 9p SAM-TR-66-52
Task 775303

Descriptors: (*Saliva, Secretion), Salivary glands, Collecting methods, Sodium, Potassium, Chlorides, Calcium, Phosphorus, Dentistry.

Parotid fluid was collected from 4,589 systemically healthy males between 17 and 22 years of age. Collection devices were placed with an absolute minimum of manipulation, and sampling continued for 90 to 120 minutes. Every effort was made to obtain, as nearly as possible, the unstimulated secretion of the parotid gland. For all 4,589 subjects from the 8 experiments the mean rate of flow was 0.040 ml./minute with an average standard deviation of 0.031 ml./minute. Values are given for 14 variables, including sodium, potassium, chloride, calcium, and phosphorus. (Author)

AD-635 736 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
ECLIPSE BURNS IN HUMANS AND LABORATORY THRESHOLD MEASUREMENTS IN RABBITS.
by Ralph G. Allen Jr, and Everett O. Richey. May 66, 11p SAM-TR-66-45
Proj. AF-5710
Task 630103

Descriptors: (*Solar eclipses, Blindness), (*Retina, Burns), Sun, Solar radiation, Thresholds (Physiology), Visual acuity, Experimental data, Ophthalmology, Rabbits, Humans.

The radiant energy incident on the retina of a human viewing the noon-day sun is calculated as 4.25 cal./cm. sq.-sec. with an image diameter of 0.16 mm., assuming an atmospheric transmission of 85% and a pupil diameter of 2.5 mm. The retinal irradiance under the limiting conditions of 100% atmospheric transmission is compared to experimentally determined retinal band 6 mm. pupil diameter is shown to be only 29 cal.1cm. sq.-sec. This retinal irradiance is compared to experimentally determined retinal burn thresholds in rabbits. It is concluded that eclipse burns, which are known to occur, would not be predicted on the basis of extrapolated animal data, and that care must be exercised in using existing animal threshold data in predicting chorioretinal damage in humans. (Author)

AD-635 737 **Field 6E, 5J**
CFSTI Prices: HC$1.00 MF$0.50
Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.
PSYCHIATRIC DISORDERS IN NAVAL PERSONNEL.
by Ransom J. Arthur. Apr 66, 11p Rept. no. 65-17
NAVMED-MF022.01.03-9002
Pub. in Military Medicine, v131 n4 p354-61 Apr 1966.

Descriptors: (*Naval personnel, *Psychiatry), (*Mental disorders, Naval personnel), Military medicine, Personality.

Psychiatric disorders have constituted a major problem for naval medical departments over many generations and throughout the world. This continues to be true today. Amongst mental disease of paramount interest to the military, character and behavior disorders hold pride of place, amounting to 75 per cent of all psychiatric invalidings from the U. S. Navy in 1961. The clinical features of these syndromes as they appear in a naval setting are, unlike those of the psychoses and neuroses, not well described in standard textbooks. A series of prototypic cases of the various types of character disorders in the naval service are delinated in order to illustrate the cardinal features of the syndromes. (Author)

AD-636 281 **Field 6E**
CFSTI Prices: HC$3.00 MF$0.75
Army Medical Research Lab., Fort Knox, Ky.
ANNUAL PROGRESS REPORT, FY 1966.
Annual progress rept., 1 Jul 65-30 Jun 66.
30 Jun 66, 82p
Projs. FY-1966-3A013001a91C, FY-1966-3A014501A74D
Projs. FY-1966-3A014501B71P, FY-1966-3A014501B71R, FY-1966-3A014501B74C.

Descriptors: (*Medical research, Reports), Vision, Hearing, Lasers, Fibrin, Enzymes, Biosynthesis, Pathology, Antigens + antibodies, Biophysics, Bites + stings, Reptiles, Venoms, Detoxification, Color vision, Vestibular apparatus, Cells (Biology), Instrumentation, Veterinary medicine, Blood transfusions, Blood coagulation, Anticoagulants, Corticosteroid agents, Blood groups, Adenine, Automation, Infectious diseases, Radiobiology, Nervous system, Physiology, Psychophysiology, Military medicine, Performance (Human), Immunity, Radiation effects, Behavior, Erythrocytes, Preservation.

The investigations reported are related to: human vision, hearing, equilibrium, strength and endurance; effects of laser on ocular structures, immune mechanisms and other biologic models; effects of irradiation on behavior of rats and mice; extending human red blood cell survival, clarifying safety limits for use of group O blood donors and supplying blood to military units; infectious diseases of laboratory animals; dissolution of blood clots; corticosteroids; analysis and detoxification of snake venom. In addition, there is a report of a Costan Rican effort related to antivenin production in that country and uncontrolled observations of treatment of human envenomation. (Author)

N66-15827 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.75
National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY. BIBLIOGRAPHY.
Jan 66, 96p NASA-SP-7011 (19)

Descriptors: *Abstract, *Aerospace medicine, *Biology (GEN), *Bibliography.

For abstract, see T 66 17.

N66-17886 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.75
National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY-A CONTINUING BIBLIOGRAPHY, WITH INDEXES, JANUARY 1966.
Feb 66, 113p NASA-SP-7011 (21)

Descriptors: *Aerospace medicine, *Biology (GEN), *Bibliography.

PB-170 463 **Field 6E, 6M**
CFSTI Prices: HC$1.00 MF$0.50
Wisconsin Univ., Madison.
RESPIRATORY VACCINE AND SURVEILLANCE STUDIES IN UNIVERSITY OF WISCONSIN FAMILIES.
Report for 1 Sep 65-28 Feb 66.
by A. S. Evans, and E. C. Dick. 28 Feb 66, 14p
Contract Ph-43-63-1127
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Respiratory diseases, Viruses), (*Vaccines, Respiratory diseases), Tissue culture, Herpes simplex virus, Myxoviruses, Adenoviruses, Mycoplasma, Pleuropneumonia-like organisms, Virus diseases, Etiology, Diagnosis, Wisconsin.

Identifiers: Rhinoviruses, Families.

Nine hundred and eight specimens were obtained by thrice weekly throat specimens taken from each member of 4 families in Eagle Heights, a University of Wisconsin graduate student housing village. The 4 families lived in one building, 408. Eight hundred thirty-seven specimens were satisfactorily processed in a diploid human embryonic cell strain, primary rhesus kidney and HEp-2. From the 621 specimens taken from these persons when healthy, nineteen viruses were obtained for an isolation rate of 3%. Eight of these viruses were Herpes simplex, one was an 'M' Rhinovirus and the remaining 10 agents were 'H' Rhinoviruses. From 216 specimens take from these persons when ill, 28 agents were obtained, for an isolation rate of 13%. All isolates were 'H' Rhinoviruses except for 2 Herpes simplex viruses and 2 'M' Rhinoviruses. All 10 Herpes simplex viruses were found in one family (408A) and these were found only sporadically through the fall and winter. The three 'M' Rhinovirus isolated were obtained serially before and during a mild cold in the mother of this 'herpetic family.' This family has been generally illness free. The clinical and virologic events in the remaining three fell chronologically into two relatively distinct clusters of illness (a) In Oct.-Dec. these families were afflicted with protracted lower respiratory illness. From one of these three families, 3 rhinoviruses were obtained, but their relationship to illness was unclean. From the other two families no virus isolates were obtained. Recently procedures for isolation Mycoplasma pneumoniae have been instituted; from 12 specimens taken during early fall 3 Eaton agent have been grown. (b) In January these families had a bout of mild upper respiratory illness and multiple isolations of 'H' rhinovirus were obtained. (Author)

PB-170 466 **Field 6E, 6M**
CFSTI Prices: HC$1.00 MF$0.50
State Univ. of New York, Syracuse. Upstate Medical Center.
VACCINE STUDIES IN A POPULATION OF FAMILIES AND A CHILDREN'S CENTER.
Semi-annual contract progress rept., 1 Sep 65-1 Mar 66.
by Harry A. Feldman. 1 Mar 66, 4p
Contract PH-43-63-563
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Vaccines, Respiratory diseases), (*Respiratory diseases, Etiology), Epidemiology, Serodiagnosis, Antigens + antibodies, Pleuropneumonia-like organisms, Mycoplasma, Virus diseases, Bacteria, Parainfluenza virus, Tissue culture, Dosage, Population, Sensitivity, Children, New York.

Identifiers: Families, Respiratory syncytial virus.

None of 53 persons who received three doses of M. pneumoniae vaccine (Lot PC-295) had a change in HI antibody status. No adverse reactions were noted. Surveillance for viral, bacterial and mycoplasmal agents has been initiated in the Children's Center. Administration of RS virus (Lot 100) and parainfluenza Type 1 (Lot 23) vaccines has been started in attendees of the Children's Center. Significant adverse reactions have not been encountered. (Author)

PB-170 474 **Field 6E, 6M**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Chicago. Coll. of Medicine.
STUDY OF VACCINES FOR IMMUNIZATION AGAINST VIRAL RESPIRATORY INFECTIONS.
Semi-annual progress rept., 26 Jun 65-1 Mar 66.
by George Gee Jackson. 1 Mar 66, 12p
Contract PH-43-65-1031
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Adenoviruses, Vaccines), (*Vaccines, Adenoviruses), Immunity, Respiratory diseases, Antigens + antibodies.

Studies have been made of a live type 4 Adenovirus which was prepared for administration as an oral vaccine by lyophilization and enteric coating. Ingestion of the capsule produced infection in all antibody-free subjects without clinical illness. A rise in specific serum antibody developed in more than one-half of the subjects within 14 days. Among Naval recruits at Great Lakes, Illinois, immunization with either the live or killed vaccine reduced the rate of Acute Respiratory Disease (ARD) requiring hospitalization by about 50% relative to cohorts who received a placebo. A study was performed in Naval and Marine recruits in San Diego, California where the rate of natural infection is low to determine whether the vaccine-induced virus infection spreads to contacts. Among childless married couples, spread was observed. The persistence of antibody induced by live and killed vaccines is being followed. Studies to distinguish the vaccine and natural strains of Adenovirus type 4 in the laboratory are being conducted. (Author)

PB-170 633 **Field 6E, 13B**
CFSTI Prices: HC$3.00 MF$0.50
Public Health Service, Washington, D. C., Div. of Dental Health.
FLUORIDATION CENSUS.
Annual ed. 3rd.
1966, 51p

Descriptors: (*Water supplies, Additives), (*Fluorides, Water supplies), Public health, Sanitary engineering, Statistical analysis, Tables.

Identifiers: Fluoridation.

The following information is presented in graphic and tabular form: Communities using fluoridated water, December 31, 1965; Annual cumulative findings on the institution, discontinuance, and reinstitution of controlled fluoridation; Distribution by population range of U.S. communities using controlled fluoridation; Authorization for fluoridation in communities fluoridating, December 31, 1965; National summary of fluoridation referenda reported through December 31, 1965; Chemical and feeder used in fluoridating water supply systems by range of population served, as of December 31, 1965; Population on public water supplies in the United States and Puerto Rico using controlled and natural fluoridation, December 31, 1965; Number and percent of water systems using controlled and natural fluoride water in the United States and Puerto Rico, December 31, 1965.

PB-170 665 **Field 6E**
CFSTI Prices: HC$1.50 MF$0.50
Leiden Univ. (Netherlands).
TRANSPLANTATION IMMUNOLOGY.
Semi-annual progress rept. 1 Sep 65-1 Mar 66.
by J. J. van Rood. 1 Mar 66, 20p
Contract NIH-PH43-65-992

Descriptors: (*Transplantation, Immunology), (*Leukocytes, Blood groups), Immune serums, Antigens + antibodies, Placenta, Skin, Agglutinins.

A panel of 167 random people has been typed to re-evaluate the monospecificity of the anti-4a, -4b, -6a, and -6b sera. A panel of 14 Philippino nurses has been typed to study the differences in antigenic composition between various racial populations. Two multi-specific sera have been extensively studied by cross-absorption and elution studies. Family studies have been performed for all groups recognized with the Leiden antisera. They make it extremely likely that the leukocyte groups Four, Six, Seven and Eight are closely linked. To facilitate the feeding of data into the computer, a new form has been devised. From placental tissue a 100-fold concentrated dry antigen preparation has been obtained. Preliminary analysis shows that the antigen activity might be related to a lipoprotein fraction of this preparation. It has, as yet, not been possible to obtain a low molecular weight active preparation. The isolation procedure described by Haughton and Davies is currently being studied. It has been possible to induce by intradermal injections of leukocytes or skin grafts, the formation of leukocyte antibodies. Intravenous injection of buffycoat forms on the moment, in our opinion, the best way to ensure the appearance of leukocyte agglutinins. (Author)

PB-170 672 **Field 6E**
CFSTI Prices: HC$4.00 MF$0.50
Hyland Labs., Los Angeles, Calif.
RESEARCH AND DEVELOPMENT IN THE FIELD OF LEUKOCYTE TYPING.
Semi-annual contract progress rept., 1 Oct 65-1 Mar 66.
1 Mar 66, 8p
Contract PH-43-65-632

Descriptors: (*Leukocytes, Blood groups), (*Immune serums, Leukocytes), Lymphocytes, Toxicity, Test methods, Immunity, Antigens + antibodies, Tissue culture, Freezing, Agglutinins, Viability.

PB-170 673 **Field 6E**
CFSTI Prices: HC$6.00 MF$0.50
New York Univ., N. Y. Medical Center.
PREPARATION OF HUMAN TRANSPLANTATION ANTIGENS FROM BLOOD LEUCOCYTES.
Progress rept. 15 Mar 65-15 Mar 66.
by Felix T. Rapaport. 15 Mar 66, 9p
Contract PH-43-65-638

Descriptors: (*Transplantation, Antigens + antibodies), (*Antigens + antibodies, Leukocytes), Preparation, Skin, Humans, Erythrocytes, Antigen-antibody reactions, ABO incompatibility, Blood groups.

Pretreatment of human recipients with transplantation antigens isolated from blood leucocytes may be associated with prolongations of survival of skin homografts obtained from the same donors. It may also induce accelerated or white graft rejection of transplants obtained from other sources. Injection of transplantation antigens pooled from a large number of donors has resulted in sharp decreases in survival times of skin grafts obtained from other unreleated individuals. Studies of the role of erythrocyte and leucocyte groups in human homograft reactions indicate that: (a) ABO group antigens play a significant role in conditioning the response of recipients to group specific skin grafts, (b) sensitization with transplantation antigens obtained from leucocyte group-incompatible sources induces in the recipients an accelerated rejection of grafts obtained from other donors selected on the basis of the same group incompatibilities. It is concluded from these studies that AB antigens of red blood cells and leucocyte group antigens are both active as transplantation antigens in man. The selection of donor-recipient combinations on the basis of erythrocyte and leucocyte group compatibility, coupled with the injection of large doses of transplantation antigens isolated from leucocytes, may provide a model for further attempts to facilitate or enhance the survival of tissue transplants in man. (Author)

PB-170 685 **Field 6E, 6O**
CFSTI Prices: HC$6.00 MF$0.50
National Inst. of Allergy and Infectious Diseases, Bethesda, Md.
IMMUNOSUPPRESSIVE DRUGS AND TRANSPLANTATION IMMUNOLOGY (A SELECTED BIBLIOGRAPHY).
1965, 14p

Descriptors: (*Transplantation, Bibliographies), (*Immunology, Transplantation), Drugs, Immunity.

PB-170 688 **Field 6E, 5B, 9B**
CFSTI Prices: HC$3.00 MF$2.00
General Dynamics/Convair, San Diego, Calif.
KARDIAK/MEDITERM BIBLIOGRAPHY.
Bibliography on Artificial Heart Research and Development Program.
15 Dec 65, 468p

Descriptors: (*Mechanical organs, Heart), (*Heart, Bibliographies), Indexes, Subject indexing, Information retrieval.

Identifiers: Coordinate indexing.

The bibliography generation technique has proved to be an important tool for the rapid compilation of large numbers of searchable literature citations. The KARDIAK/MEDITERM bibliography demonstrates that it is unnecessary to employ a specialist in the field to index citations using this system. The keypuncher/indexer is able to function efficiently with minimal instructions. Initial input on paper tape with subsequent conversion to punched cards alleviates the problem of error correction and verification while providing a hard copy record of all input documents. Standard information storage and retrieval computer programs were used for this task, with the exception of the 'Yellow Dog' FORTRAN language program for the generation of header cards. S-C 4020 formats were used which provided the most convenient and easy-to-read layout for the dual dictionary as well as the citation and author listings. (Author)

PB-170 736 **Field 6E, 5A, 5B**
CFSTI Prices: HC$3.00 MF$1.00
National Cancer Inst., Bethesda, Md.
PROPOSED CATEGORIES FOR CLASSIFYING THE SUBJECT CONTENT OF RESEARCH GRANTS ON A PHS-WIDE BASIS.
by John H. Schneider. Aug 64, 179p

Descriptors: (*Public health, Research program administration), (*Research program administration, Public health), Subject indexing, Classification, Indexes.

Identifiers: Thesauri, Hierarchy, Descriptors.

The person responsible for coding the subject content of research grants was contacted in 11 Institutes/Divisions of the National Institutes of Health and in 11 Divisions of the Bureau of State Services. In most cases these individuals furnished lists of words from which more than 4,000 terms and categories (presently used by Institutes/Divisions to code the subject content of research grants) were obtained and incorporated. The terms obtained from the PHS Institute/Divisions were incorporated into a strictly hierarchical decimal classification which has cross references between categories. The cross references aid in the precise definition of categories and they help the indexer locate related categories. The classification consists of approximately 1300 separate categories--each identified by a separate number consisting of one or two digits, a decimal point, and no more than 6 digits to the right of the decimal point. (There is no theoretical limit to the number of digits beyond 6 that could be added since the code is completely open-ended.) The terms incorporated into this classification are listed in an alphabetical INDEX which identifies the category to which each word has been assigned. (Author)

AD-635 598 See Field 6R
AD-635 612 See Field 6I
AD-635 614 See Field 6N
AD-635 754 See Field 6R
AD-635 984 See Field 6A
AD-635 985 See Field 6A
AD-636 117 See Field 6M
PB-170 425 See Field 6D
PB-170 462 See Field 6J
PB-170 464 See Field 6M
PB-170 465 See Field 6M
PB-170 467 See Field 6M
PB-170 469 See Field 6M
PB-170 712 See Field 6L

6F. ENVIRONMENTAL BIOLOGY

N66-18088 **Field 6F**
CFSTI Prices: HC$1.00 MF$0.50
IIT Research Inst., Chicago, Ill.
LIFE IN EXTRATERRESTRIAL ENVIRONMENTS.
Quarterly status rept. no. 4, 15 Nov 65-15 Feb 66.
by C.A. Hagen. 1966. 20p IITRI-L6023-4
Contract NASr-22
NASA-CR-70524

Descriptors: *Bacillus, *Environment simulation, *Extraterrestrial environment, *Mars environment, *Germination.

PNE-481 **Field 6F, 8G, 6R, 8 K**
CFSTI Prices: HC$9.25 MF$4.75
British Columbia Univ., Vancouver.
ENVIRONMENT OF THE CAPE THOMPSON REGION, ALASKA.
by Norman J. Wilimovsky, and John N. Wolfe.
1966, 1265p
Prepared in cooperation with Atomic Energy Commission, Washington, D. C. Environmental Sciences Br.

Descriptors: (*Alaska, Biology), (*Biology, Alaska).

Identifiers: Cape Thompson.

For abstract, see N 20 15.

AD-636 119 See Field 8A
PB-170 608 See Field 8A

6G. ESCAPE, RESCUE, AND SURVIVAL

AD-635 595 See Field 6S

6H. FOOD

AD-636 221 **Field 6H, 6M**
CFSTI Prices: HC$2.00 MF$0.50
Swift and Co., Chicago, Ill.
INCIDENCE OF CLOSTRIDIUM BOTULINUM IN RAW MEATS.
Final technical rept., 22 Jul 63-1 Dec 65.
by R. B. Tompkin. Jun 66, 36p
Contract DA-19-129-AMC-161 (N)
Proj. DA-1-K-0-12501-A-033
FD-50, USA-NLABS-66-44-FD

Descriptors: (*Meat, *Clostridium botulinum), Spores, Toxins + antitoxins, Pasteurization, Biological contamination, Culture media, Sampling, Periodic variations, Statistical analysis.

Two thousand three hundred fifty eight (2.358) raw meat samples were analyzed for putrefactive and botulinal spores. Of 19,727 P.A. isolates, only one was botulinal (Type C). 77% of the samples had 3 P.A.'s/g or less. The overall mean was 2.82 P.A.'s/g. (Author)

PB-170 634 **Field 6H**
CFSTI Prices: HC$4.00 MF$0.50
Public Health Service, Washington, D. C. Div. of Environmental Engineering and Food Protection.
MILK LABORATORIES APPROVED BY FEDERAL AND STATE AGENCIES.
1966, 43p PHS-Pub-999-FP-5

Descriptors: (*Milk, Laboratories), (*Laboratories, Milk), Public health, Law, Standards, Personnel, Test facilities.

The document concerns laboratories which operate in accordance with the Public Health Service Grade 'A' Pasturized Milk Ordinance. The development of milk laboratory certification activities are discussed, and criteria for PHS certification as a State Milk Laboratory Survey Officer are given. Tables list: central milk laboratories of states; state-designated milk laboratory survey officers as of 1 April 1966; and State-approved local laboratories listed by location and type (official, commercial, and industry), and including numbers of bacteriologists listed by sex.

6I. HYGIENE AND SANITATION

AD-635 612 **Field 6I, 6E**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
ORAL HYGIENE PROCEDURES IN THE PRESENCE OF A 'TUBETYPE' DIET.
Rept. for Mar 64-Oct 65.
by Timothy J. O'Leary, Arthur J. Stumpf Jr, and Paul V. Sundberg Jr. May 66, 14p SAM-TR-66-44
Task 775303

Descriptors: (*Mouth, *Hygiene), (*Diet, Hygiene), (*Teeth, Hygiene), Cleaning, Hardness, Toilet articles, Infections.

Three studies were carried out to explore the effects of a liquid 'tube-type' diet on gingival status and plaque accumulation when subjects employed (1) their usual oral hygiene procedures without a dentifrice, and (2) various proposed oral hygiene procedures without a dentifrice. The initial 35-day study evaluated changes in gingival health and plaque status that occurred when subjects employed their usual oral hygiene practices without a dentifrice. There were significant mean increases in the scores for gingival inflammation ($P < .01$) and in plaque accumulation ($P < .05$). A second study evaluated the efficiency of two proposed minimal oral hygiene procedures for 33 days. There was a statistically significant increase ($P < .01$) in gingival inflammation, but no mean increase in plaque scores. A third study evaluated the relative efficiency of three oral hygiene procedures for a 44-day period. There was no significant increase in gingival inflammation or plaque accumulation during the experimental period. (Author)

N66-12250 **Field 6I**
CFSTI Prices: HC$1.00 MF$0.50
Public Health Service, Washington, D. C. Biophysics Section.
REDUCTION OF BACTERIAL DISSEMINATION, GERMICIDAL ACTIVITY OF ETHYLENE OXIDE, REDUCTION OF BACTERIAL CONTAMINATION ON SURFACES.
Quarterly summary rept. no. 5.
Nov 65, 8p
Contract NASA Order R-137
NASA-CR-68090

Descriptors: *Bacteriology, *Contamination, *Microorganism.

For abstract, see T 66 17.

6J. INDUSTRIAL (OCCUPATIONAL) MEDICINE

PB-170 462 **Field 6J, 6E, 6M**
CFSTI Prices: HC$1.00 MF$0.50
Virginia Univ., Charlottesville.
SURVEILLANCE OF RESPIRATORY INFECTIONS IN AN INDUSTRIAL POPULATION.
Semi-annual contract progress rept., 1 Sep 65-28 Feb 66,
by William S. Jordan Jr, Jack M. Gwaltney Jr, and J. Owen Hendley. 28 Feb 66, 18p
Contract Ph-43-63-1128
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Respiratory diseases, Industrial medicine), (*Industrial medicine, Respiratory diseases), Virus diseases, Adults, Children, Immune serums, Serodiagnosis, Tissue culture cells, Laboratory equipment, Growth, Toxicity, Viruses, Antigens + antibodies, Epidemiology, Pleuropneumonia-like organisms, Mycoplasma.

Identifiers: Rhinoviruses.

Between July 24, 1965, and February 18, 1966, rhinoviruses were isolated from 35% of respiratory illnesses occurring in an industrial population. The maximum isolation rate occurred coincident with the early fall increase in illness rates. During the past three fall illness peaks, rhinoviruses have accounted for 40% to50% of respiratory symptoms. A pilot study of illnesses in families of 50 selected employees failed to relate rhinovirus infections in adults to infections in children with the opening of school. A total of 248 rhinovirus strains have now been isolated. Of 195 strains which have been tested vs. 20 to 64 antisera, 119 have been identified. Twenty-nine types have been encountered. Serotyping, production of antisera, and characterization of possible new prototypes remain major activities. Although tedious, typing of isolates is essential to description of recurrent peaks, and to attempt to describe spread within the office or the home. A micro-neutralization test using human embryonic lung cells has been developed for the testing of rhinovirus isolates in schemata of intersecting pools of antisera. Toxicity of immune serum pools was encountered with plastic and plexiglass plates, but not with small glass tubes. (Author)

6K. LIFE SUPPORT

AD-636 044 **Field 6K**
CFSTI Prices: HC$4.00 MF$1.00
Biotechnology, Inc., Arlington, Va.
EFFECTIVE LIFE SUPPORT HELMETS.
by James F. Parker Jr, and Richard F. Dillon. 1963, 146p Rept. no. 64-3
Sponsored in part by ONR. Proceedings of an Invited Symposium, Washington, D. C., 31 Oct-1 Nov 63.

Descriptors: (*Pressure suits, Helmets), (*Helmets, *Life support), Effectiveness, Symposia, Design, Test equipment, Oxygen, Safety.

Contents: Philosophy of current protective helmet; Defects of current Navy helmets; Accident data related to APH-5 performance; Improved accident reporting procedures related to helmet performance; Cooling and ventilation requirements for life support helmets; Communications requirements for life support helmets; Lens and visor systems influencing helmet design; Oxygen requirements in future helmet design; Dynamic testing of protective helmets; Design criteria and parameters of life support helmets; Navy philosophical considerations in future helmet design; Summary of recommended specifications for improved life support helmet.

N66-17221 **Field 6K**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
SPACE VEHICLE WATER RECLAMATION SYSTEMS.
by V. G. Collins, and D. C. Popma. 1965, 35p
NASA-TM-X-56123
Presented at the Aiche Natl. Meeting on Aerospace Life Support Systems (55th), Houston, Tex., Feb 7-11, 1965.

Descriptors: *Water recovery, *Weight factor, *Space vehicle.

For abstract, see T 66 17.

AD-635 656 **See Field 13J**

6L. MEDICAL AND HOSPITAL EQUIPMENT

PB-170 712 **Field 6L, 6E**
CFSTI Prices: HC$3.00 MF$0.50
National Research Council of Canada, Ottawa (Ontario). Div. of Mechanical Engineering.
A BIOLOGICAL HEAT EXCHANGER FOR BRAIN COOLING.
by T. R. Ringer, and E. W. Peterson. Apr 66, 20p
DME-ISC-38

Descriptors: (*Heat exchangers, Medical equipment), (*Brain, Cooling), (*Surgical techniques, Brain), (*Hypothermia, Brain), Blood circulation, Cannulation.

Neurosurgery is limited by failure of the brain to withstand any extended period without a blood supply. Fortunately the metabolic rate of brain tissue is proportional to its temperature and the higher nervous system can withstand much lower temperatures than the heart. A system for selective cooling of the brain is described. The engineering and medical problems that must be satisfied are discussed. A heat exchanger of novel design was developed and has been used experimentally over a two-year period. In experimental surgery brain temperatures of 5C. have been obtained with the blood supply to the brain subsequently occluded for periods of one hour with recovery. (Author)

PB-170 468 **See Field 6M**

6M. MICROBIOLOGY

AD-480 715 **Field 6M, 13L, 14B**
CFSTI Prices: HC$4.00 MF$0.50
Associated Engineers and Consultants, Inc., Garden City, N. Y.
DESIGN CRITERIA FOR MICROBIOLOGICAL FACILITIES AT FORT DETRICK. VOLUME I. INTRODUCTION.
1 Mar 66, 49p
Contract DA-18-064-AMC-401 (A)
See also AD-480 716.

Descriptors: (*Microbiology, Test facilities), (*Biological laboratories, Safety), Standards, Safety, Design, Hazards, Cooling + ventilating equipment, Laboratory equipment, Army research, Construction, Costs, Bibliographies.

The manual is based mainly on biological safety considerations. Volume I provides an introduction to the subject matter both for managers and the specialized users of Volume II. The volume in-

cludes a discussion of safety philosophy and some representative construction cost data slanted primarily toward management needs. It also includes a brief description of basic microbiological facility design principles aimed primarily at the architect and engineer. A selected bibliography of the literature on microbiological laboratory design concludes the volume. (Author)

AD-480 716 **Field 6M, 13L, 14B**
CFSTI Prices: HC$4.00 MF$1.25
Associated Engineers and Consultants, Inc., Garden City, N. Y.
DESIGN CRITERIA FOR MICROBIOLOGICAL FACILITIES AT FORT DETRICK. VOLUME II. DESIGN CRITERIA.
1 Mar 66, 257p
Contract DA-18-064-AMC-401 (A)
See also AD-480 715.

Descriptors: (*Microbiology, Test facilities), (*Biological laboratories, Safety), Handbooks, Military requirements, Design, Hazards, Control systems, Instrumentation, Construction, Civil engineering, Structures, Heating, Cooling + ventilating equipment, Specifications, Air conditioning equipment, Pipes, Test equipment, Costs, Electrical equipment, Laboratory equipment, Lighting equipment, Safety devices, Toxic agent alarms, Decontamination, Wastes (Sanitary engineering), Communication systems.

Volume II is prepared for the use of architects and engineers in designing new or modified microbiological facilities for Fort Detrick. It is divided into six sections, corresponding to the normal division of design work: architectural; heating, ventilation, and air-conditioning; piping; equipment and accessories; electrical; and instrumentation and controls. Each section is designed to be largely self-contained for the use of the individual specialists involved. A detailed Table of Contents, an alphabetical Subject Index, numerous illustrative plates, a glossary, and supporting appendices also are included. (Author)

AD-635 952 **Field 6M, 6C**
CFSTI Prices: HC$6.00 MF$1.25
Fairchild Hiller Corp., Farmingdale, N. Y. Republic Aviation Div.
STUDY OF THE FECAL BACTERIAL POPULATION OF CHIMPANZEES.
Final rept., Oct 64-Dec 65.
by Phyllis E. Riely. May 66, 230p FHR-2544-5FR
Contract AF 29 (600)-4991
Proj. AF-6892
ARL-TR-66-13

Descriptors: (*Chimpanzees, Bacteria), Enterobacteriaceae, Streptococcus, Mycobacterium, Pasteurella pseudotuberculosis, Corynebacterium, Spirochaeta, Pleuropneumonia-like organisms, Lactobacillus, Fungi, Candida, Digestive system, Excretion, Culture media, Humans.

Identifiers: Feces, Aerobes, Anaerobes.

Cultures isolated from rectal swabs obtained from 100 chimpanzees, as well as from two fecal samples from five chimpanzee handlers, were studied. The data obtained from the aerobic bacterial studies were summarized in tables grouping the occurrence of the Enterobacteriacea, streptococcus, and miscellaneous aerobes so that comparisons could be made with the results obtained on two prior studies. The data of the occurrence of the anaerobic bacterial cultures were summarized in tables as obligate or facultative anaerobes, using the same method of grouping the cultures as in prior studies. Differences in the anaerobic character of chimpanzees and human fecal populations was noted; the percentage of obligate anaerobes exceeding 90% for the human cultures, and ranging between 26% and 71% for the chimpanzee cultures. A literature survey was conducted to aid in the evaluation of the potential pathogenicity of bacterial strains isolated from the chimpanzee. A remarkable similarity exists in the aerobic flora of primates, although differences in the pathogenicity of particular species of bacteria for various primate hosts have been reported in the literature. Carrier states are prevalent in the chimpanzee. The anaerobic fecal population of the chimpanzee differs from man. (Author)

AD-636 116 **Field 6M**
CFSTI Prices: HC$1.00 MF$0.50
Naval Medical Research Unit No. 4, Great Lakes, Ill.
INFLUENCE OF pH ON RECOVERY OF MYCOPLASMA FROM THE HUMAN OROPHARYNX.
by William H. Kraybill, and York E. Crawford.
Jun 66, 4p RU-66.17
NAVMED-MR-005.09-1305.2

Descriptors: (*Mycoplasma, Growth), (*Culture media, pH), Throat, Humans, Sensitivity, Pleuropneumonia-like organisms.

Recently published data indicate that a pH of 5.5 to 6.5 rather than usual pH 7.8 favors growth of T strain Mycoplasma and at least one classical species, M. salivarium. This information, based on laboratory-adapted cultures, raises the question of whether or not a pH lower than 7.8 would increase the sensitivity of PPLO agar for isolation of mycoplasmas from the human oropharynx. The number of colonies and variety of species from throat swabs of the first 50 patients was compared on pH 5.0, 6.0, 7.0, and 8.0 PPLO agar enriched with 10% horse serum. The recovery of M. pneumoniae from throat swabs of another 50 patients was compared at the above pH levels on PPLO agar containing 20% horse serum and 0.002% methylene blue. Positive cultures in the first group were as follows: 78% at pH 5.0, 94% at pH 6.0, 88% at pH 7.0, and 78% at pH 8.0. Highest incidence of M. pharyngis occurred at pH 7.0 and of M. salivarium at pH 5.0 and 6.0. The one M. hominis type 1 isolate grew evenly over the entire range of pH tested. In the second group, a pH of 7.0 and 8.0 was optimal for the recovery of M. pneumoniae. It was concluded that, excepting M. pneumoniae, the human oral mycoplasmas are more frequently isolated on PPLO agar of pH 6.0 and 7.0. (Author)

AD-636 117 **Field 6M, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Naval Medical Research Unit No. 4, Great Lakes, Ill.
MYCOPLASMA FLORA IN EXUDATIVE PHARYNGITIS.
by York E. Crawford, and John P. Griffin. Jun 66, 4p RU-66-18
NAVMEDMR-005.09-1305.2

Descriptors: (*Mycoplasma, Diseases), (*Throat, Infections), Etiology, Secretion, Culture media, Growth, Pleuropneumonia-like organisms, Inhibition.

Although Mycoplasma hominis type 1 was reported to produce exudative pharyngitis in human volunteers, an etiological role has not been demonstrated for this organism in the naturally occurring disease. This study included 30 naval recruits with exudative pharyngitis with an equal number of controls. Throat swabs were inoculated onto PPLO agar for the isolation of M. hominis and other Mycoplasma species that inhabit the oropharynx. To determine if there was a predominant species associated with exudative pharyngitis, isolates were identified by growth inhibition. The presence of M. hominis type 1 was not demonstrated in subjects with pharyngitis, although there were >700 colonies grown on a plate from one control. M. pneumoniae was isolated from two controls. Nine subjects with pharyngitis and six controls yielded M. pharyngis (orale type 1). M. salivarium was recovered from 22 subjects with pharyngitis and from 17 controls. On primary isolation, the colony counts of M. salivarium were greater more often in subjects with pharyngitis ($P = <0.01$). In 11 instances, 6 from pharyngitis and 5 from controls, M. salivarium and M. pharyngis occurred as mixed cultures. It was concluded that M. hominis type 1 was not associated with the exudative pharyngitis of these men. (Author)

N66-15150 **Field 6M**
CFSTI Prices: HC$2.00 MF$0.50
National Defense Research Organization T.N.O., The Hague (Netherlands). Medical Biological Lab.
THE CULTURE COLLECTION OF THE DEPARTMENT FOR MICROBIAL GENETICS. II. THERMOSENSITIVE MUTANTS OF ESCHERICHIA COLI.
by I. M. Dijkmans, A. Rorsch, A. M. Schepman, P. Van de Putte, and J. Van Dillewijn. Sep 65, 39p MBL-1965-25

Descriptors: *Culture (Biol), *Genetics, *Mutation.

For abstract, see T 66 17.

PB-170 464 **Field 6M, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Maryland Univ., Baltimore. School of Medicine.
THE TESTING OF EXPERIMENTAL RESPIRATORY AGENTS AND VACCINES IN VOLUNTEERS.
Semi-annual contract progress rept., 15 Nov 65-15 Mar 66.
by Richard B. Hornick. 15 Mar 66, 17p
Contract Ph-43-66-63
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Vaccines, Respiratory diseases), (*Respiratory diseases, Vaccines), Mycoplasma, Pleuropneumonia-like organisms, Throat, Serodiagnosis, Antigens + antibodies, Parainfluenza virus, Tissue culture, Embryonated egg technique, Resistance (Biological), Dosage.

Identifiers: Respiratory syncytial virus.

The studies were designed to determine the virulence of a virus challenge pool and to evaluate vaccines to prevent respiratory viral and mycoplasma infections. A challenge pool containing respiratory syncytial virus was inoculated by nasopharyngeal route in seven subjects to determine its virulence. Clinical attack rate and serologic conversion by CF test were 71% (5/7), whereas the conversion rate by the NT was 43% (3/7). The virus was reisolated from 71% of the subjects. A mild 'cold' type illness was observed after three days incubation and persisted for five days. The best correlation between the illness, virus recovery and antibody conversion was established in the subjects with a low pre-challenge antibody level. However, some of the subjects with a high antibody level also became ill and shed virus. The live, egg-origin vaccine virus of parainfluenza 3 produced a very mild coryza in two of six subjects who received the vaccine in the nasopharynx. No evidence of antibody stimulation was detected and re-isolation of the virus was unsuccessful. The live, egg-origin vaccine virus of parainfluenza 2 induced a nonspecific upper respiratory illness which persisted for about three days in five of eight men who received the vaccine in the nasopharynx. Incubation period ranged from one to seven days. Two men produced hemadsorbing agents in monkey kidney cells on first day of illness. Two lots of killed vaccines of glass-grown, purified Mycoplasma pneumoniae were administered intramuscularly in 15 men and 23 men respectively utilizing primary and booster doses. None of the recipients of either vaccine developed illness. (Author)

PB-170 465 **Field 6M, 6E**
CFSTI Prices: HC$2.00 MF$0.50
National Drug Co., Philadelphia, Pa.
DEVELOPMENT AND PREPARATION OF CONCENTRATED AND PURIFIED VACCINES OF ADENOVIRUSES (TYPES 1, 2, 3, 4, 5 AND 7) AND PARAINFLUENZA VIRUSES (TYPES 1, 2, 3 AND 4).

Semi-annual contract progress rept., 1 Sep 65-1 Mar 66.
by W. J. Thomas, and J. L. DeMeio. 1 Mar 66, 34p
Contract Ph-43-63-79
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Adenoviruses, Vaccines), (*Parainfluenza virus, Vaccines), (*Vaccines, Preparation), Storage, Stability, Viability, Temperature, Contamination, Antigens + antibodies, Serodiagnosis, Ribonucleic acids, Embryonated egg technique, Biological assay, Guinea pigs.

Identifiers: Respiratory syncytial virus.

Stability studies were made on four formalin-inactivated experimental adenovirus vaccines (no. 1 - crude, no. 2 - 20X methanol concentrate, no. 3 - 5X methanol concentrate, and no. 4 - soluble antigen preparation). Vaccine 1, stored at 4C in the liquid state, showed a significant drop in potency after six months. Vaccine 2 showed a loss of titer after nine months, and Vaccine 3 after 12 months. Vaccine 4 was stable after 12 months storage at 4C. Storage data of liquid vaccines at -60C indicate that Vaccine 2 showed a significant loss in potency after nine months while Vaccine 3 lost potency after three months. Vaccines 1 and 4 were stable after nine months under this storage condition. The original passages of adenovirus types 1, 2, 3, 4, 5 and 7 in GMK were discarded because of SV40 contamination. New attempts have proceeded through five and six passages and remain free of SV40. Adaptation of adenovirus types 1, 2, 3, 4, 5 and 7 to WI-38 has progressed well and most of the types are in the eighth or ninth passage. Investigations into the production of soluble antigen preparations have been initiated. The use of iso-electric precipitation in the presence of ribonucleic acid has been shown to be a practical method. Crude amniotic fluids from embryonated eggs infected with parainfluenza types 1, 2 and 3 viruses were collected for the preparation of a 3X concentrated triple vaccine. Attempts were made to adapt the respiratory syncytial virus to the embryonated hen's egg. (Author)

PB-170 467 **Field 6M, 6E**
CFSTI Prices: HC$2.00 MF$0.50
Pfizer (Chas.) and Co., Inc., Terre Haute, Ind.
A PROGRAM FOR RESEARCH AND DEVELOPMENT OF RESPIRATORY DISEASE VACCINES.
Semi-annual contract progress rept., 15 Sep 65-15 Mar 66.
by Rachel J. Mason. 15 Mar 66, 43p
Contract PH-43-63-582
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Respiratory diseases, Vaccines), (*Vaccines, Preparation), Pleuropneumonia-like organisms, Mycoplasma, Parainfluenza virus, Embryonated egg technique, Antigens+antibodies, Serodiagnosis, Biological assay, Viability, Tissue culture, Growth, Immunity, Effectiveness.

Identifiers: Respiratory syncytial virus.

Prototype lots of inactivated Mycoplasma pneumoniae, Respiratory Syncytial and three monovalent parainfluenza virus vaccines are undergoing clinical trials. A continued effort to improve earlier, essentially experimental, vaccines has yielded encouraging results with both RS virus and Mycoplasma pneumoniae. Zinc precipitation of RS virus is an effective means of concentration. However, the successful removal of zinc ion from the final product continues to be a critical problem. Extension of the finding that M. pneumoniae can be grown as layers of organisms adherent to glass surfaces has led to the rapid development of prototype vaccines prepared in this manner. These contain considerably higher concentrations of M. pneumoniae than was possible in suspension cultures. Furthermore, no concentration step is required. Animal potency tests indicate these to have considerable antigenicity. Two lots of vaccine prepared by this newer method are now in clinical trial at Parris Island, S. C. to establish their immunogenic and prophylactic effectiveness. Parainfluenza viruses, types I, II and III, have been successfully adapted to growth in leukosis-free egg embryos. Further adaptation of these agents to leukosis-free CETC is in progress with early results suggesting that good growth in this system will be successfully attained. Serologic testing on approximately 4000 sera from clinical trials of early type M. pneumoniae vaccine have been completed and forwarded to the Naval Medical Field Research Laboratory for decoding and analysis. (Author)

PB-170 468 **Field 6M, 6L**
CFSTI Prices: HC$1.00 MF$0.50
Flow Labs., Inc., Rockville, Md.
OPERATION OF A SEROLOGY AND TISSUE CULTURE DEVELOPMENTAL LABORATORY.
Semi-annual contract progress rept., 1 Sep 65-1 Mar 66.
by L. Potash, J. Broyhill, A. Shirai, and B. H. Sweet 1 Mar 66, 13p
Contract PH-43-63-103
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Tissue culture, Preparation), (*Biological laboratories, Operation), Antigens+antibodies, Freezing, Immune serums, Viability, Mycoplasma, Medical technicians, Training.

PB-170 469 **Field 6M, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Colorado Univ., Denver. Medical Center.
RESPIRATORY VIRUS VACCINE EVALUATION AND SURVEILLANCE.
Semi-annual contract progress rept., 15 Sep 65-15 Mar 66.
by T. Jacob John, Mikio Minamitani, Jerry Eller, and Joseph Joyner. 15 Mar 66, 23p
Contract Ph-43-62-477

Descriptors: (*Vaccines, Respiratory diseases), Immunity, Infants, Children, Parainfluenza virus, Mycoplasma, Pleuropneumonia-like organisms, Serodiagnosis, Antigens + antibodies, Tissue culture, Biological assay.

Identifiers: Hemagglutination-inhibition tests, Actinomycins.

The successful immunization of young infants with simultaneously administered parainfluenza types 1, 2 and 3 aqueous virus vaccines is described. The rates for successful immunization in initially seronegative vaccines were 75% for parainfluenza 1, 76% for type 2 and 71% for type 3. No local or systemic side effects were reported or observed. Continued evaluation of Tween-80 and ether disruption of parainfluenza type 2 virus is detailed. T-80 ether treated antigen was found to yield higher HIA titers in individual sera than non-treated antigen. The production of 'complete' virus in higher titer was accomplished by removal of the tissue culture fluid and inoculum at 3 hours post-infection and harvest at 72 hours. This resulted in an extremely high (4096) titer of hemagglutinin after T-80 and ether treatment. The replication of parainfluenza 2 virus was found to be adequate in FL amnion cell cultures. This has led to an inexpensive source of antigen. Actinomycin D was found to enhance the multiplication of parainfluenza virus in monkey kidney tissue culture probably by increasing the number of 'complete' virus particles. A method for calculating the number of virus particles in a parainfluenza virus suspension is described based upon the measurement of erythrocytes at the 1+hemagglutination endpoint. Direct hemagglutinin of guinea pig erythrocytes by mycoplasma pneumoniae has been demonstrated. A hemagglutination-inhibition serum antibody assay is described. The results of respiratory agent isolation in infections of infants and children are detailed. (Author)

PB-170 470 **Field 6M**
CFSTI Prices: HC$1.00 MF$0.50
Saint Louis Univ., Mo. Inst. for Molecular Virology.
COMPARATIVE MOLECULAR STRUCTURE OF ONCOGENIC AND NONONCOGENIC ADENOVIRUSES.
Semi-annual progress rept., 15 Sep 65-15 Mar 66.
by Maurice Green. 15 Mar 66, 21p
Contract PH-43-64-928
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Adenoviruses, Molecular structure), (*Neoplasms, Adenoviruses), Chemical properties, Physical properties, Molecular properties, Desoxyribonucleic acids, Nucleotides, Morphology (Biology), Amino acids, Electron microscopy, Vaccines, Biological assay.

The characterization of the 31 human adenoviruses with regard to chemical and physical properties, DNA base composition, DNA homology, and tumorigenicity, is virtually complete. The adenovirus contains only protein and from 11.6 to 13.5% DNA. They may be arbitrarily divided into three categories with regard to base composition and DNA nucleotide sequence homology. The grouping according to molecular parameters has permitted accurate predictions with regard to oncogenic potential. Purified virus preparations of the adenoviruses in the high G+C group thus far have not induced virus specific tumors in newborn hamsters and therefore appear to be 'nononcogenic;' those in the low G+C group produce tumors in most animals injected within a few months after inoculation and are therefore 'highly oncogenic;' of those in the imtermediate G+C group, all but type 11 and 21 have produced tumors in a small proportion of animals after a relatively long period of time. These, therefore, may be classified as 'weakly oncogenic.' Strongly oncogenic types 12 and 18 are closely related to each other, showing 80% nucleotide sequence homology. The weakly oncogenic adenoviruses appear to form a separate family of adenoviruses which share 69-100% of their nucleotide sequences. However, the 'weakly oncogenic' adenoviruses are quite unrelated to the 'strongly oncogenic' adenoviruses, possessing only 6-22% of their nucleotide sequences in common. These data do not permit a conclusion however as to whether or not these two tumor-producing adenovirus groups possess a common 'carcinogenic nucleotide sequence.' (Author)

PB-170 471 **Field 6M**
CFSTI Prices: HC$2.00 MF$0.50
Flow Labs., Inc., Rockville, Md.
ONCOGENICITY TESTING OF CANDIDATE VIRAL RESPIRATORY VACCINE STRAINS AND TUMOR REAGENT PROGRAMS.
Semi-annual progress rept., 1 Sep 65-1 Mar 66.
by R. V. Gilden, and T. Beddow. 1 Mar 66, 33p
Contract PH-43-64-1169
Rept. to Inst. of Allergy and Infectious diseases.

Descriptors: (*Vaccines, Neoplasms), (*Neoplasms, Viruses), Adenoviruses, Antigens + antibodies, Parainfluenza virus, Pleuropneumonia-like organisms, Injection (Medicine), Respiratory diseases, Tissue culture, Immune serums, In vitro analysis, In vivo analysis, Hamsters, Rats, Mice.

Identifiers: Rhinoviruses, Respiratory syncytial virus.

One hundred twenty-four viral inocula representing 57 strains of candidate respiratory or potential vaccine seed strains hve been inoculated into newborn hamsters, rats, and mice. In addition, approximately 4,000 hamsters injected as newborn with various purified and concentrated human Adenoviruses have been received for observation. Of these, 16 inocula representing five Adenovirus types (3, 4, 7, 22, 30) have yielded tumors in hamsters. Viral-induced, tumor-specific antigens have

been demonstrated only for Types 3 and 7 at present. Tumors derived from Types 4, 30, and 22 inocula appear to be atypical and are presumably 'spontaneous'. Other inocula representing Adenovirus Types 1 to 30; Parainfluenza Types 1, 2, 3; Respiratory syncytial virus; PPLO; and five Rhinoviruses have not, thus far, yielded tumors. A reagent program designed to produce quantities of high-titered tumor antisera was initiated. Relatively large quantities of serum were produced for tumors induced by Adenovirus Types 7, 21, 12, 18, and 31; in contrast, only one or two positive sera were obtained from Types 3 and 14 tumor-bearing hamsters. Sporadic antibody production was also obtained for SV40, Rous, and the Polyoma tumor lines. Study of these reagents revealed some unexpected cross-reactions between the two distinct Adenovirus tumor groups. Further study showed that only an occasional animal's serum showed such cross-reaction, but the specificity of the reaction remains to be established. (Author)

PB-170 472 **Field 6M**
CFSTI Prices: HC$2.00 MF$0.50
Parke, Davis and Co., Detroit, Mich.
FEASIBILITY STUDY: PARAINFLUENZA VIRUS ISOLATED ANTIGEN VACCINE.
Semi-annual progress rept., 1 Sep 65-1 Mar 66.
by Frank B. Brandon. 1 Mar 66, 41p
Contract PH-43-66-37
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Parainfluenza virus, Vaccines), (*Vaccines, Preparation), Antigens + antibodies, Growth, Tissue culture, Physical properties, Agglutinins, Thermal stability, Density, Feasibility studies.

Work was initiated upon receipt of seed virus for type 1 parainfluenza on September 22, 1965, and all studies to date have been with this virus. Assuming that hemagglutinating activity is a function of particle concentration and hence, of animal potency, first efforts were directed to developing techniques for the optimal growth and concentration of monkey kidney tissue culture grown virus. Virus grown and concentrated in a standard manner was then used for preliminary extraction and stability studies. Biological and physical characterization of the extracted antigens was begun. It appears that any of several extraction techniques can be used to increase hemagglutinin titer, although the antigens derived by different techniques differ with respect to at least one physical property-density. The thermal stability of the hemagglutinin of intact virus was compared to that of the extracted antigens; and the latter appeared to be somewhat more stable than the intact virus. However, it appears that lack of stability will be a major problem with vaccine preparation. (Author)

PB-170 473 **Field 6M**
CFSTI Prices: HC$2.00 MF$0.50
Wyeth Labs., Inc., Philadelphia, Pa.
TO DEVELOP IMPROVED POLYVALENT ADENOVIRUS VACCINE TO PROVIDE A BASE FOR OTHERS AGAINST VIRAL AGENTS IN RESPIRATORY ILLNESS.
Semi-annual progress rept., 15 Sep 65-15 Mar 66.
by Howard Tint, and B..A. Rubin. 15 Mar 66, 46p

Contract PH-43-63-80
Rept. to Natl. Inst. of Allergy and Infectious Diseases.

Descriptors: (*Adenoviruses, Vaccines), (*Vaccines, Adenoviruses), (*Respiratory diseases, Vaccines), Growth, Tissue culture, Antigens + antibodies, Influenza virus, Parainfluenza virus, Fluorescent antibody techniques.

Adenovirus types 1, 2, 3, 4, 5, 7, 14 and 21 have been adapted to growth in simian kidney free of extraneous agents. All these strains except type 21 are also being successfully carried in WI-38 culture. Adenovirus subunit vaccines were prepared by a variety of methods. CF and neutralizing antigens have been isolated. Live virus vaccines made with adenovirus type 4, influenza A2 (2 types), and parainfluenza types 1, 2 and 3 have been tested and put into clinical trials. (Author)

PB-170 675 **Field 6M**
CFSTI Prices: HC$4.00 MF$0.50
Tuskegee Inst., Ala. Carver Research Foundation.
PRODUCTION OF ENTEROVIRUS ANTISERA.
Semiannual progress rept. no. 13, 1 Sep 65-1Mar 66.
by R. W. Brown. 1 Mar 66, 13p
Contract PH43-62-180

Descriptors: (*Enteroviruses, Immune Serums), (*Immune serums, Enteroviruses), Coxsakie virus, Echo virus, Antigens + antibodies, Equines, Immunity, Tables.

AD-635 929 **See Field 21D**

AD-636 221 **See Field 6H**

PB-170 462 **See Field 6J**

PB-170 463 **See Field 6E**

PB-170 466 **See Field 6E**

PB-170 474 **See Field 6E**

6N. PERSONNEL SELECTION AND MAINTENANCE (MEDICAL)

AD-635 614 **Field 6N, 6E, 5I**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
ASTROSTOMATOLOGY. DENTAL STANDARDS FOR THE SELECTION AND EXAMINATION OF SPACE CREWMEN.
by Jack L. Hartley, and Gaylord L. Hall. Jun 66, 10p SAM-TR-66-56
Task 775303

Descriptors: (*Space crews, Medical examination), (*Dentistry, Space crews), Selection, Mouth, Teeth, Standards, Astronauts, Pathology, Hygiene.

Identifiers: Oral hygiene, Astrostomatology.

The report establishes guidelines for the necessary dental standards, examination procedures, and treatment criteria in support of manned space missions and simulated flights. Included are initial and final screening requirements, the establishment of oral hygiene and preventive measures, and treatment recommendations. The preflight examination, in-flight monitoring, and postflight examinations for both chamber and actual flights are presented. A format for reporting the dental protocol of these flights is included. (Author)

AD-635 989 **Field 6N, 6P**
CFSTI Prices: HC$3.60 MF$0.50
Oslo Univ. (Norway). Inst. of Work Physiology.
PHYSICAL FITNESS IN TERMS OF MAXIMAL OXYGEN INTAKE OF NOMADIC LAPPS.
Final technical rept., pt. 2.
by K. Lange Andersen, R. E. Elsner, Bengt Saltin, and Lars Hermansen. 31 Aug 61, 36p
Grant AF-EOAR-61-32
AAL-TR-61-53 (2)

Descriptors: (*Physical fitness, *Oxygen consumption), Norway, Exercise, Blood chemistry, Arctic regions.

Physical fitness in terms of aerobic working capacity was measured in nomadic Lapps living in the northern part of the Scandinavian peninsula. 49 men between 10 and 55 years of age, and 21 girls were studied. Aerobic capacity was determined by measuring oxygen consumption during exercise on a bicycle ergometer. Two or three submaximal loads were used. The maximal work lasted 3-4 minutes, during which the subjects worked as hard as they could. Blood lactate taken after this heavy run showed that the oxygen requirement exceeded oxygen intake, thus indicating that maximal values for oxygen intake were achieved during this type of exercise. The values for maximal oxygen intake of nomadic Lapps increased steadily from the age of 10 up to 18, from an average of 1.4 1/min. to about 3.5 1/min. The latter value remained essentially unchanged up to the age of 30 years in men. Maximum oxygen consumption then decreased to about 2.5 1/min at 50 years of age. No sex differences were noted in subjects below 15 years of age. (Author)

6O. PHARMACOLOGY

AD-292 260 **Field 6O, 7C**
CFSTI Price: HC$1.50
Little (Arthur D.) Inc., Cambridge, Mass.
THE SYNTHESIS OF ANTI-RADIATION DRUGS-III.
Final rept., 1 Oct 61-1 Dec 62.
by Edward R. Atkinson, G. Richard Handrick, and Felix E. Granchelli. 1 Dec 62, 192p C-62481
Contract DA-49-193-MD-2071

Descriptors: (*Radioprotective agents, Synthesis (Chemistry)), (*Organic sulfur compounds, Radioprotective agents), Amides, Hydrazine derivatives, Thiols, Molecular structure, Spectra (Infrared).

Identifiers: Thioacids.

Ten drugs drawn from the class of amides and hydrazides of mercapto acids were prepared. About half of the effort was devoted to the successful synthesis of three other compounds: 2-amino-2-methyl-1,3-propanedithiol, 3-amino-4-mercapto-1-butanol, and 2,4-diamino-1-butanethiol. These three substances were of interest because of their particular significance to the relation between structure and radioprotective action in living systems. Because the substances each contained three functional groups, their syntheses from available starting materials were lengthy, including at least five consecutive steps. It was found necessary to carry out considerable process development work on the earlier steps of each synthesis in order to obtain quantities of intermediate adequate for subsequent steps. Details of the experimental work are recorded, as are infrared spectra for all compounds submitted and for important intermediates. Literature dealing with specific chemical compounds of interest was covered systematically through the 1961 Formula Indexes of Chemical Abstracts.

AD-635 947 **Field 6O**
CFSTI Prices: HC$2.00 MF$0.50
Institute for Research, State College, Pa. Div. of Psychobiology.
DRUG EFFECTS UPON PERFORMANCE UNDER TASK-INDUCED STRESS.
Research rept.
by Paul M. Hurst, and Marianna F. Weidner. Jan 66, 32p ONR-H-66-1
Contract Nonr-4423 (00)
Proj. NR-144-189

Descriptors: (*Psychotropic agents, *Behavior), Stress (Psychology), Performance (Human), Tranquilizers, CNS stimulants, Amines, Sulfates, Psychophysiology, Performance tests.

Identifiers: Dextroamphetamine sulfate, Ritalin, Librium.

An experiment was performed to test the interaction between drug/placebo effects and incentive conditions under task-induced stress. Sixty-three student volunteers served in a factorially designed experiment varying level of incentive, drug condition, and placebo condition (whether or not the subject was led to believe he had received a drug). All active drugs were given in disguised form. These included d-amphetamine sulfate (10 mg.),

CHLORDIAZEPOXIDE HCL (10 mg.), and methylphenidate HCL (10 mg.). Neither the incentive nor the 'placebo condition' factor had a significant effect upon performance. D-amphetamine showed a significant superiority to other drug conditions early in the session. Most of this superiority derived from the "high stress" condition. Mood effects were also noted. Results were interpreted as favoring a mood-related component in performance enhancement rather than the psychoanalytic factor. (Author)

AD-635 948 **Field 6O**
CFSTI Prices: HC$2.00 MF$0.50
Institute for Research, State College, Pa. Div. of Psychobiology.
A VIEWPOINT ON "DRUG ENHANCEMENT".
by Paul M. Hurst. Jan 66, 29p ONR-H-66-2
Contract Nonr-4423 (00)
Proj. NR-144-189

Descriptors: (*Drugs, Effectiveness), Behavior, Stress (Psychology), Pharmacology, Psychotropic agents, CNS stimulants, Amines, Reviews, Performance (Human).

Pertinent experimental literature is reviewed concerning drug enhancement of cognitive performance. Results are synthesized into a viewpoint concerning psychological mechanisms by which performance can be enhanced, with emphasis upon stressful situations. Criteria are advanced for operational distinction of tasks and/or situations where enhancement effects may be predicted for particular classes of drugs. Preliminary specifications are devised for experimental verification of parts of the theoretical framework. (Author)

CONF-651111 **Field 6O, 7E, 18B, 6R**
CFSTI Prices: HC$5.00 MF$3.00
Oak Ridge Inst. of Nuclear Studies, Inc., Tenn.
RADIOACTIVE PHARMACEUTICALS.
by Gould A. Andrews, and Ralph M. Kniseley.
Apr 66, 702p
Contract AT (40-1)-GEN-33
Prepared in cooperation with John Hopkins Univ., Baltimore, Md. School of Medicine. Proceedings of a symposium held at the Oak Ridge Institute of Nuclear Studies, Tennessee, November 1-4, 1965, 6th AEC Symposium series.

Descriptors: (*Radioprotective agents, Symposia), (*Pharmacology, Labeled substances).

For abstract, see N 20 15.

PB-170 685 **See Field 6E**

6P. PHYSIOLOGY

AD-635 633 **Field 6P, 20A, 17B**
CFSTI Prices: HC$1.00 MF$0.50
Royal Inst. of Tech., Stockholm (Sweden). Speech Transmission Lab.
ACOUSTIC SPECIFICATION OF SPEECH.
Final scientific rept. 1 Jan-31 Dec 65.
by C. G. M. Fant. 31 Jan 66, 15p
Grant AF-EOAR-51-65
AFCRL-66-294
See also AD-615 578.

Descriptors: (*Speech, Analysis), (*Acoustics, Speech transmission), Speech recognition, Auditory perception Auditory signals, Synthesis, Specifications, Instrumentation.

This report summarizes results from speech research during the calendar year of 1965 at the Speech Transmission Laboratory mainly in the field of speech production and speech analysis. (Author)

AD-635 659 **Field 6P**
CFSTI Prices: HC$3.00 MF$0.75
Karolinska Institutet, Stockholm (Sweden). Dept. of Physiology.
VASCULAR REACTIVITY IN CATS DURING INDUCED CHANGES IN THE ACID-BASE BALANCE OF THE BLOOD.
by Stellan Bygdeman. 1963, 64p
Grant AF-EOAR-62-14
Published in Acta Physiologica Scandinavica, v61 suppl 222.

Descriptors: (*Cardiovascular system, *Acidosis), Blood vessels, Acid-base equilibrium, Blood, Blood circulation, Blood pressure, Vasoactive agents, Levarterenol, Stimulation, Dosage, Respiration, Carbon dioxide, Oxygen, Autonomic nervous system, Chemoreceptors, Reflexes, Contraction, pH, Sweden.

Identifiers: Angiotensins.

The aim of the present investigation was to study the mechanisms by which the cardiovascular effect of vasoconstrictor stimuli are modified during respiratory acidosis and primarily the behaviour of some vascular beds in the peripheral circulation. The reactivity (responsiveness) of peripheral vessels during acid-base shifts was estimated in the following vascular beds perfused in situ using the cats own blood and with a constant flow perfusing technique: a) muscle vessels (skinned hind leg), b) skin and muscle vessels (unskinned hind leg) and c) renal vessels (kidney). Changes in reactivity during acid-base shifts were determined either as the change in the pressor response of a vasoconstrictor stimulus or as the ratio between doses elicitating the same pressor response both during the control period and during a period of changed acid-base balance. Respiratory acidosis decreased the systemic blood pressure responses to injected noradrenaline and the decrease was correlated with the degree of acidosis. To induce the same pressor response during ventilation with 20% CO_2 in O_2 as during a control period the dose of noradrenaline had to be increased 37 times. The decreased effect of noradrenaline on the cardiovascular system could partly be explained by a decreased reactivity of the perfused vascular beds. The decrease in response to noradrenaline of the peripheral vessels was most marked in the unskinned leg, less in the kidney and least in the skinned leg. The decreased reactivity of peripheral vascular beds (skinned and unskinned leg) during respiratory acidosis could partly be attributed to the activation of the sympathetic nervous system. The change in reactivity to injected noradrenaline which was observed in a sympathetically denervated vascular bed (skinned hing leg) during different types of acid-base shifts of the blood was closely related to induced alterations in blood pH. Changes in CO_2-tension of the blood affected vascular reactivity mainly through its ability to change pH. The effect of injected angiotensin was decreased during acidosis to the same degree as noradrenaline. (Author)

AD-635 854 **Field 6P**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
THE EFFECT OF LIGHT ON THE KETOSTEROID EXCRETION.
by E. Wallner, M. Karapesi, and M. Radnot. 26 May 66, 14p FTD-TT-65-1867
TT-66-61801
Unedited rough draft trans. of Acta Chirurgica (Hungary) v4 n3 p181-8 1963.

Descriptors: (*Steroid, Excretion), Ketones, Light, Diurnal variations, Rhythm (Biology), Urine, Hungary.

The day-night rhythmicity of ketosteroid excretion was studied in hospitalized patients, as well as the effect of light or the influence of the temporary elimination of light on the extent and the rhythm of the ketosteroid excretion. The 12 hour night fraction proved to be 30.5% less than the same fraction taken during the day. Complete darkness lasting from 7 to 10 days reduced the mean value of the excreted ketosteroids, although the day-night rhythm persisted. (Author)

AD-635 955 **Field 6P, 6A**
CFSTI Prices: HC$2.00 MF$0.50
Tufts Univ., Medford, Mass. Dept. of Mechanical Engineering.
A STUDY IN MOLECULAR SENSATION.
Semi-annual rept.
by Dwight W. Batteau, and William M. Hemmes.
24 Mar 66, 39p Rept. no. 1
Contracts Nonr-4863 (00), N123 (60530)-52597A

Descriptors: (*Sensory perception, Molecular properties), (*Molecular energy levels, Sensory perception), Electron transitions, Probability, Ground State, Nerve impulses, Theory.

The hypothesis is posed that organic sensation is provided by shifting the probability of transition of electrons from excited states to the ground state in organic molecules. Also hypothesized is that the action potentials observed are metabolic artifacts and not carriers of sensory signals. A description of applicable theory and two experiments are presented, as well as a few abstracted corollary remarks from the literature. (Author)

AD-635 983 **Field 6P**
CFSTI Prices: HC$3.60 MF$0.50
Oslo Univ. (Norway). Inst. of Work Physiology.
METABOLIC AND THERMAL RESPONSES TO MUSCULAR EXERTION IN THE COLD.
Final technical rept., pt. 1.
by K. Lange Andersen, S. Stromme, and R. W. Elsner. Sep 61, 36p
Grant AF-EOAR61-32
AAL-TR-61-52 (1)

Descriptors: (*Exercise, Adaptation (Physiology)), (*Metabolism, Exercise), Body temperature, Norway, Blood circulation.

The metabolic and thermal responses to muscular exertion in a cold environment were studied in outdoor and indoor workers. The resting metabolic rate in a thermally neutral environment was significantly higher for the outdoor workers. In a situation of general body cooling without muscular exercise metabolic response was less for the outdoor workers. The metabolic rate during exercise was found to be higher in all subjects in the cold environment than in the warm environment at low levels of work, at higher workloads it was the same. There was a tendency towards lower oxygen uptake in the cold of the outdoor workers than of the indoor workers at low levels of work. At high levels it was essentially the same. The rectal temperature was not altered significantly in the cold when the work performed was light. At higher levels of work rectal temperature increased in the cold, reaching an equilibrium which was the same as when the same amount of work was performed in a thermally neutral environment. No differences in rectal temperature were found between outdoor and indoor workers. (Author)

AD-635 986 **Field 6P, 5J**
CFSTI Prices: HC$1.60 MF$0.50
Cambridge Univ. (England).
VISUAL PERCEPTION OF MOVEMENT.
Final rept. 1 Apr 62-31 Mar 63.
by Richard L. Gregory. 8 Apr 63, 19p
Grant AF-EOAR-61-13

Descriptors: (*Visual perception, *Motion), Display systems, Motion sickness, Light, Eye, Great Britain.

Experimental techniques are presented for investigating perception during relative movement of the observer and the display.

AD-635 987 **Field 6P, 5J**
CFSTI Prices: HC$3.60 MF$0.50
Cambridge Univ. (England). Psychological Lab.
VISUAL PERCEPTION FROM THE ENGINEERING POINT OF VIEW. STABILITY AND DISTORTIONS OF VISUAL SPACE.
by Richard L. Gregory. 1962, 33p
Grant AF-EOAR-61-13

Prepared for presentation at the International Congress on Human Factors at Long Beach, Calif., 3-4 May 62.

Descriptors: (*Visual perception, *Motion), Distortion, Vision, Nervous system, Afterimages, Space perception, Great Britain, Stability.

For abstract, see T 66 17.

AD-635 991 **Field 6P**
CFSTI Prices: HC$3.00 MF$0.50
Oxford Univ. (England). Radcliffe Infirmary.
PULSATILE PRESSURE-FLOW RELATIONSHIPS IN THE PULMONARY ARTERIAL SYSTEM OF MAN.
Technical rept.
by G. de J. Lee. Jan 64, 53p
Grant AF-EOAR-62-21

Descriptors: (*Lungs, *Blood circulation), Blood pressure, Capillaries, Respiration, Volume, Oxygen, Carbon dioxide, Cardiovascular diseases, Arteries, Pulse rate, Measurement, Flowmeters, Great Britain.

Identifiers: Plethysmography.

Contents: The effect of pulsatile capillary blood-flow upon gas exchange within the lungs of man; The effects of cardiac action upon lung gas volume; Indirect assessment of the pulmonary artery-left atrial pressure gradient in patients with mitral valve disease, using the N2O-plethysmograph-flowmeter method; The effects of venous filling pressure and heart rate upon the right ventricular stroke volume.

AD-636 083 **Field 6P**
CFSTI Prices: HC$1.00 MF$0.50
Laval Univ., Quebec. Laboratoires d'Endocrinologie.
NEUROHUMORAL CONTROL OF THYROTROPIC ACTIVITY.
Final technical rept., 1 Oct 63-30 Sep 65.
by Claude Fortier. 30 Sep 65, 26p
Grant AF-AFOSR-511-64
Proj. AF-9777
Task 977701
AFOSR-66-1476

Descriptors: (*Hormones, Secretion), Adrenocorticotropic hormone, Steroids, Thyroid hormones, Pituitary hormones, Exposure, Cold weather tests, Inhibition, Stimulation, Thyroxine, Adaptation (Physiology), Canada.

Studies on the levels of interaction between ACTH, TSH, corticosteroid and thyroid hormones are described. (Author)

N66-16015 **Field 6P**
CFSTI Prices: HC$1.00 MF$0.50
Institute for Perception RVO-TNO, Soesterberg (Netherlands).
THE ELECTRORETINOGRAPHIC RESPONSE TO WEAK STIMULI OF LARGE SUBSTENSE.
by N. M. J. Schweitzer, and A. Troelstra. 1965, 22p IZF-1965-15, TDCK-43437

Descriptors: *Dark adaption, *Perception, *Electroretinogram, *Physiological response, *Retinal adaptation, *Visual stimulus.

For abstract, see T 66 17.

N66-16016 **Field 6P, 9B**
CFSTI Prices: HC$1.00 MF$0.50
Institute for Perception RVO-TNO, Soesterberg (Netherlands).
DIGITAL COMPUTATIONS OF TEMPERATURE IN RETINAL BURN PROBLEMS.
by J. J. Vos. 1963, 24p IZF-1965-16, TDCK-43438
Grant N1H-FR-00016-02

Descriptors: *Burn injury, *Digital computer, *Retina, *Temperature measurement.

N66-18316 **Field 6P**
CFSTI Prices: HC$7.00 MF$1.75
Massachusetts Inst. of Tech., Brookline.
GLIA BIBLIOGRAPHY, 1960-1964.
by M. S. Little, and J. Morris. 1965, 328p
Grants NsG-462, PHS-GM-10211-03
NASA-CR-70631
Prepared in cooperation with Navy Grant Nonr (G)-00089-64.

Descriptors: *Biological cell, *Neurology, *Bibliography, *Nervous system.

AD-635 580 **See Field 6D**

AD-635 623 **See Field 6A**

AD-635 989 **See Field 6N**

6R. RADIOBIOLOGY

AD-490 567 **Field 6R**
CFSTI Price: HC$3.60
Air Force Special Weapons Center, Kirtland AFB, N. Mex.
SOME POSSIBLE IMPROVEMENTS OF THE DT-60/PB, CP-95A/PD SYSTEM.
by W. C. Bryan, M. R. Annis, and R. Cowles. Oct 58, 33p AFSW-TN-58-24
Proj. 7806
Task 78004

Descriptors: (*Dosimeters, Gamma rays), (*Gamma rays, Dosimeters), Radiation measurement systems, Calibration, Dose rate.

A brief review of the present status of the DT-60/PD, CP-95A/PD system is given. In its present state this system can be of considerable value to the Air Force and to the bearer if properly used. Some possible measures to improve the system include an improved DT-60/PD design soon forthcoming from the US Navy; a modification of the system developed by the Air Force Special Weapons Center, the results of which are reviewed; and a procedure for improving CP-95A/PD calibration. Recommendations for corrective action are given. (Author)

AD-635 559 **Field 6R, 6C**
CFSTI Prices: HC$1.00 MF$0.50
Naval Medical Research Inst., Bethesda, Md.
EFFECT OF WHOLE BODY X-IRRADIATION ON HEMOLYMPH PROTEINS OF LIMULUS POLYPHEMUS.
Research rept.
by F. Lee Rodkey, Pierre-Marie Niaussat, and Maxime Mackenzie. 1 Apr 65, 11p
NAVMED-MR-005.02-0011.01-7

Descriptors: (*Whole body irradiation, *Arthropods), (*Blood proteins, *Radiation effects), Xrays, Blood, Radiological dosage, Electrophoresis, In vitro analysis.

Identifiers: Limulus.

Hemolymph of the 'horseshoe crab' Limulus polyphemus was studied by ultracentrifugation and paper electrophoresis. Immature and mature specimens of this species were subjected to whole body X-irradiation up to 60,000 r in a single dose. The number of components in the hemolymph and their sedimentation constants were estimated by ultracentrifugation. No consistent difference was found between the whole hemolymph of control and irradiated specimens. Separation of components by paper electrophoresis likewise did not show a consistent difference between hemolymph of control and irradiated animals. (Author)

AD-635 598 **Field 6R, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
STUDIES ON THE RADIOSENSITIVE PHASE OF THE PRIMARY ANTIBODY RESPONSE. II. THE EFFECT OF MACROPHAGES FROM IRRADIATED DONORS ON ABILITY TO TRANSFER ANTIBODY FORMATION.
by James F. Pribnow, and Myron S. Silverman. 13 Jun 66, 20p USNRDL-TR-1029
NAVMED-MR005.08-1200-4

Descriptors: (*Radiation effects, *Antigens + antibodies), (*Phagocytes, Radiation effects), Peritoneum, X-rays, Gamma globulin, Response, Antigen-antibody reactions, Lymphatic systems, Cells (Biology), Radiation tolerance, Biosynthesis, Sensitivity, Rabbits.

Peritoneal exudate cells were harvested from rabbits which had received 450, 550, or 750 R x-irradiation twenty-four hours previously. After incubation with bovine gamma globulin these cells were injected into normal rabbits. When donors had received 750 R, no antibody response was elicited in the recipients. The response to sensitized irradiated macrophages which had received 450 or 550 R was varied. In no case did the degree of antibody response appear to depend on the number of sensitized cells injected. Irradiated recipients receiving sensitized irradiated macrophages (550 R) together with lymph node cells from normal rabbits were unable to form antibody. The implications of these findings in relation to the radiosensitive phase of the antibody response are discussed. (Author)

AD-635 600 **Field 6R**
CFSTI Prices: HC$1.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
COLONY-FORMING UNIT REPOPULATION AND SPLIT-DOSE RADIOSENSITIVITY IN ENDOTOXIN TREATED AND CONTROL LAF1 MICE.
by Gerald E. Hanks, and E. John Ainsworth. 23 May 66, 22p USNRDL-TR-1024
NAVMED-MR005.08-5201-1

Descriptors: (*Radiation effects, *Hemopoietic system), (*Toxins + antitoxins, Radiation effects), Radiation injuries, Cells (Biology), Bone marrow, Spleen, Radiological dosage, Lethal dosage, Sublethal dosage, Mice.

Radiosensitivity of an animal, in terms of survival or death following midlethal exposure, is thought to be related to the surviving number of hematopoietic stem cells. After a sublethal exposure to radiation an animal's sensitivity to a subsequent exposure (LD50) might also be expected to be related to the number of stem cells which are present at any given time. In the present experiments with mice, the relationship was studied between split-dose LD50 and changes in the numbers of nucleated cells in the femur and the femoral content of colony-forming units (CFU's). These CFU's are proliferative cells in the marrow which when transplanted have the capacity to form nodules in the spleens of supralethally irradiated recipient mice. Many stem cell-like attributes have been conferred to CFU's and the CFU is frequently referred to as a hematopoietic stem cell. Changes in marrow cellularity and CFU content were studied for three weeks after exposure to 450 R, and preliminary LD50's were determined at 5 or 14 days. One group of animals was given bacterial endotoxin before the 450 R exposure. During the first week after 450 R, the endotoxin-treated animals showed an accelerated recovery in terms of numbers of nucleated marrow cells and CFU's, and at day 5 the femoral CFU content of the endotoxin-treated animals was ten times as great as that of the controls. However, at this time the LD50 of the endotoxin-treated animals was only 50 R higher than the controls. At 14 days, the femoral CFU content of the control animals was approximately four-fold greater than that of the endotoxin-treated group, but the LD50's of the two groups were quite similar. Therefore, in these experiments with endotoxin-treated and control animals, the femoral CFU content and split-dose radiosensitivity have been found to vary independently. (Author)

AD-635 661 **Field 6R, 6C**
CFSTI Prices: HC$1.60 MF$0.50
Stockholm Univ. (Sweden). Dept. of Zoology.
BEHAVIORAL EFFECTS OF RADIOLESIONS IN THE BRAIN OF THE PIGEON (COLUMBA LIVIA). APPENDIX I.
Final technical rept.
by Eric Fabricius. 25 Jun 63, 14p
Contract AF 61 (052)-138, Grant AF-EOAR-62-12
Supported in part by contract AF 61 (052)-195.
Prepared for presentation at the International Symposium on the Response of the Nervous System to Ionizing Radiation (2nd), Laboratory of Nuclear Medicine and Radiation Biology, Univ. of Calif., Los Angeles, August 1963.

Descriptors: (*Pigeons, Behavior), (*Behavior, Radiation effects), (*Radiation effects, Central nervous system), Radiation injuries, Brain, Radiological dosage, Nervous system, Physiology, Reproduction (Physiology), Ingestion (Physiology), Ganglia, Learning, Flight, Motion, Sweden.

Brain lesions produced by local irradiation with high energy protons were used to study the role of the cerebral hemispheres in the control of behavior in pigeons. Complete intersection of the cerebral peduncles resulted in a total loss of spontaneous feeding and drinking, escape responses and social behavior. Balancing movements and an advanced visual control of locomotion persisted, including the ability of avoiding obstacles during flight and of precision landing. Transsection of the cerebral peduncles except part of the tractus occipito-mesencephalicus gave similar symptoms, except that escape responses persisted for a longer period. In birds with more rostral lesions, sparing the posterior portion of the lateral forebrain bundle as well as the tractus occipito-mesencephalicus, the ability of spontaneous eating and drinking persisted, as well as the escape responses, and even social behavior was observed. Transsection of the median forebrain bundle (tractus septo-mesencephalicus) produced no obvious behavioral changes, except for some very slight abnormalities in copulatory behavior in one bird and a slight impairment of retention in learning tests in another individual. However, these effects could as well be described to damage to some paleostriatal tissue included in the lesions. Restricted lesions in various parts of the basal ganglia had, as a rule, no visible effect on behavior. Exceptions were some few birds in which abnormally strong escape reactions were observed, particularly after irradiation in the anterior or posterior parts of the striatum. Moreover, slight disturbances of mating behavior were observed in one bird, and some birds with lesions in the median parts of the striatum showed signs of a slight impairment of performance in learning tests. (Author)

AD-635 662 **Field 6R, 6C**
CFSTI Prices: HC$1.00 MF$0.50
Stockholm Univ. (Sweden). Dept. of Zoology.
EFFECTS OF TELENCEPHALIC RADIOLESIONS ON LEARNING AND RETENTION IN THE PIGEON (COLUMBA LIVIA). APPENDIX II.
Final technical rept.
by Lennart Steen. 30 Nov 63, 22p
Grants AF-EOAR-62-12, AF-EOAR-62-84

Descriptors: (*Pigeons, Behavior), (*Behavior, Radiation effects), (*Radiation effects, Central nervous system), (*Learning, Radiation effects), Retention, Radiation injuries, Brain, Nervous system, Physiology, Response, Sweden.

Learning experiments were performed with 12 pigeons with restricted telencephalic lesions produced by means of high energy proton beams. The lesions were mainly placed at the level of the anterior commissure or slightly frontal to that level. The results of the learning experiments are discussed together with those of 7 earlier irradiated pigeons. Eleven pigeons showed normal learning ability and retention in comparison to non-irradiated pigeons. Out of the 3 remaining pigeons one showed decreased learning ability, 6 ones decreased retention and one finally decreased learning ability as well as decreased retention. It is concluded that 4 of the cases with decreased retention may be related to damages in the lateral forebrain bundles while the other cases are more obscure. The effects cannot with certainty be related to certain telencephalic structures. Neither can they in a simple way be related to the size of the lesions, although larger lesions than those obtained in this material may give other results. Observations on escape responses showed that the radiation brought about changes in this respect in 5 of the pigeons. Increased escape responses are believed to be the effect of (a) shock conditions after the radiation, (b) physiological changes during the development of the lesions or (c) possibly the situation of the lesions. Decreased escape responses may in one case be related to intersection of the occipito-mesencephalic tracts. Social responses to man were observed in three pigeons, which also showed decreased escape responses. It is suggested that the lesions are responsible for the latter phenomenon and thus they are only indirectly related to the development of social responses to man. (Author)

AD-635 735 **Field 6R**
CFSTI Prices: HC$2.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
RECOVERY FROM RADIATION INJURY IN SWINE AS EVALUATED BY THE SPLIT-DOSE TECHNIQUE.
by D. S. Nachtwey, E. J. Ainsworth, and G. F. Leong. 18 May 66, 27p USNRDL-TR-1025
NAVWEPS-MR005.08-5201-1

Descriptors: (*Radiation injuries, Recovery), Radiological dosage, X-rays, Sublethal dosage, Radiation tolerance, Hematology, Swine.

Identifiers: Split-dose technique.

With 1 Mvp X rays, the acute LD50/30 (midline air dose) of 8-9 month old Duroc gilts was determined to be 399 R (95% confidence interval: 371-424 R). The pattern of recovery from the effects of 240 or 265 R of X rays was studied by means of the split-dose technique, which consists of conditioning the animals with a sublethal exposure and redetermining the LD50 at various times thereafter. By this criterion, the swine had recovered from 51% of the initial injury by three days. By seven days, they appeared to have recovered from about 65% of the initial injury, but the data suggest that part of the population had recovered completely while part was still about as sensitive as at three days. By twenty days, the entire population appeared to be radioresistant: the redetermined LD50 was 164% of the LD50 of unconditioned animals. Radioresistance was also evident at 61 and 107 days: at 61 days, 734 R killed eight out of 15 animals conditioned with 265 R whereas, the same exposure killed 15 of 15 unconditioned animals; at 107 days, none of nine conditioned animals died after 399 R. The pattern of systemic recovery and the period of radioresistance are not clearly reflected in the pattern of hematological changes that follow a conditioning exposure. (Author)

AD-635 754 **Field 6R, 6E**
CFSTI Prices: HC$4.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
MEASUREMENT OF THE ANTIBODY RESPONSE BY THE ELIMINATION OF I131-LABELED PROTEINS. I. THE ELIMINATION OF I131-LABELED PROTEINS FROM THE BLOOD OF NORMAL MICE.
by W. W. H. Weyzen, and M. S. Silverman. 19 May 66, 49p USNRDL-TR-1020
NAVMED-MR005.08-1200-4

Descriptors: (*Antigens + antibodies, Radiation injuries), (*Radiation injuries, Recovery), (*Labeled substances, Excretion), (*Radiation effects, Immunity), Proteins, Blood, Mice, X-rays, Whole body irradiatio, Radioactive isotopes, Blood plasma, Serum albumin, Gamma globulin, Iodine, Radioactivity, Half life.

The effect of a number of variables on the elimination of I131-labeled proteins from the blood of normal mice was studied. The purpose of these studies was to arrive at a critical evaluation of the antigen elimination technique which will be used for the measurement of the immune response in studies on the recovery from radiation injury. The method is based on the fact that the biological half-life of a protein is reduced in the presence of specific antibodies in the blood. It was found that the elimination of I131-horse serum albumin in normal LAF1 mice - under the experimental conditions employed - was not affected by the amount of protein injected or by the time of sampling. Although the degree of labeling had no effect on the half-life measured, a shift of the elimination curve was observed which was time dependent. This change was attributed to radiation damage of the protein by the radioactive label. The elimination characteristics of a number of different proteins for possible use in the immunization experiments was studied. Considerable differences were observed in the way closely related proteins were eliminated from the blood. The half-life of the albumins ranged from 13.36 hours for I131-porcine serum albumin to 22.03 hours for I131-dog serum albumin. (Author)

AD-635 820 **Field 6R, 12B, 15C**
CFSTI Prices: HC$1.00 MF$0.50
Research Triangle Inst., Durham, N. C.
RADIOLOGICAL RECOVERY REQUIREMENTS, STRUCTURES, AND OPERATIONS RESEARCH: INTRODUCTION AND SUMMARY.
Final rept., 19 Feb 65-6 Jun 66.
by Joseph T. Ryan. 6 Jun 66, 23p
Contract N228 (62479)-68153
Proj. RTI-OU-214

Descriptors: (*Radiological contamination, Decontamination), (*Decontamination, *Cost effectiveness), (*Civil defense systems, Operations research), (*Analog computers, Feasibility studies).

Identifiers: Postattack operations.

The primary objective of this study is to determine cost and effectiveness information relating to the application of decontamination and the extent of its utility when applied to the recovery of extensive city areas in a postattack environment. The general approach toward meeting the objectives of the study, including a brief description of each of the models developed under the contract, is outlined. The command and control aspects of municipal decontamination are summarized, and the results of a systems analysis of decontamination are briefly stated. The results of the extensive realcities analyses conducted under the subtask are summarized. Both general and specific conclusions and recommendations are stated. The results of the real-cities analyses showed that roof decontamination is an important part of most combined strategies of decontamination. These results also showed that the recovery of substantial city areas and multi-building complexes could be accelerated appreciably by practicable decontamination procedures. (Author)

AD-635 821 **Field 6R, 12B, 15C**
CFSTI Prices: HC$3.00 MF$0.75
Research Triangle Inst., Durham, N. C.
RADIOLOGICAL RECOVERY REQUIREMENTS, STRUCTURES, AND OPERATIONS RESEARCH. VOLUME I. GENERAL CONSIDERATIONS.
Final rept., 19 Feb 65-6 Jun 66.
by Joseph T. Ryan, Thomas Johnson, and Sylvia W. Walker. 6 Jun 66, 97p
Contract N228 (62479)-68153
Proj. RTI-OU-214

Descriptors: (*Radiological contamination, Decontamination), (*Decontamination, Urban areas), (*Civil defense systems, Operations research), Recovery, Structures.

Identifiers: Postattack operations.

This study examines the application of decontamination strategies to extensive urban areas. Urban areas of various sizes (from a few acres to an interconnected system involving hundreds of acres) are examined with regard to decontaminating vital sections and their connecting links. The task of creating decontaminated 'islands' or marshalling areas is determined to be feasible. The nature and scope of command and control system elements required for conducting effective decontamination is practical situations is determined together with the preattack and postattack data required by such a system. Several models were developed during the course of the project and are discussed. (Author)

AD-635 822 **Field 6R, 12B, 15C, 9B K**
CFSTI Prices: HC$5.00 MF$1.00
Research Triangle Inst., Durham, N. C. Operations Research and Economics Div.
RADIOLOGICAL RECOVERY REQUIREMENTS, STRUCTURES AND OPERATIONS RESEARCH. VOLUME II. DEVELOPMENT OF ANALYTICAL, COMPUTER, AND SYSTEMS MODELS IN SUPPORT OF DECONTAMINATION ANALYSIS.
Final rept. 19 Feb 65-6 Jun 66.
by Joseph T. Ryan, and Thomas Johnson. 6 Jun 66, 175p R-OU-214-Vol-2
Contract N228 (62479)-68153
Proj. RTI-OU-214
USNRDL-TRC-16-Vol-2

Descriptors: (*Radiological contamination, Decontamination), (*Analog computers, Design), (*Decontamination, Analysis), (*Civil defense systems, Operations research).

Identifiers: Postattack operations.

The volume contains six supporting studies. Described are a number of models for determining the cost and effectiveness of decontaminating municipal areas. One study examines the system components of a command and control system for municipal decontamination. These studies cover the following subjects: (1)A Feasibility Study of the Application of Analog Computers to the Analysis of Decontamination; (2) A circular Model for Approximating Gamma Ray Intensity at a Single Detector Location; (3) A Square-Grid Model for Approximating Gamma Ray Intensity at a Single Detector Location; (4) A Point Source Model for Approximating Gamma Ray Intensity at a Single Detector Location (The Equivalent Planes Method); (5) A FORTRAN Program for Decontamination Analysis; and (6) The Nature and Scope of Command and Control System Elements Required for Conducting Effective Decontamination in Municipalities.

AD-635 823 **Field 6R, 12B, 15C**
CFSTI Prices: HC$6.00 MF$1.25
Research Triangle Inst., Durham, N. C. Operations Research and Economics Div.
RADIOLOGICAL RECOVERY REQUIREMENTS, STRUCTURES AND OPERATIONS RESEARCH. VOLUME III. DECONTAMINATION ANALYSIS OF SELECTED SITES AND FACILITIES IN SAN JOSE, CALIFORNIA.
Final rept. 19 Feb 65-6 Jun 66.
by Sylvia M. Walker. 6 Jun 66, 244p R-OU-214-Vol-3
Contract N228 (62479)-68153
Proj. RTI-OU-214
USNRDL-TRC-16-Vol-3

Descriptors: (*Radiological contamination, Decontamination), (*Cost effectiveness, *Decontamination), (*Civil defense systems, *California), Operations research, Recovery.

Identifiers: Postattack operations.

The volume contains the cost and effectiveness data for decontamination analyses of sixteen sites and facilities in San Jose, California. Costs are measured in team-hours of effort. Decontamination effectiveness is measured in terms of fractions of dose-rate remaining at specified detector locations and fractions of dose remaining for persons who perform functions requiring specified daily activity patterns at the sites and facilities chosen. (Author)

AD-635 824 **Field 6R, 12B, 15C**
CFSTI Prices: HC$6.00 MF$1.50
Research Triangle Inst., Durham, N. C. Operations Research and Economics Div.
RADIOLOGICAL RECOVERY REQUIREMENTS, STRUCTURES, AND OPERATIONS RESEARCH. VOLUME IV. DECONTAMINATION ANALYSIS OF SELECTED SITES AND FACILITIES IN DETROIT, MICHIGAN.
Final rept.
by J. T. Ryan. 6 Jun 66, 289p R-OU-214-Vol-4
Contract N228 (62479)-68153
Proj. RTI-OU-214
USNRDL-TRC-16-Vol-4

Descriptors: (*Radiological contamination, Decontamination), (*Decontamination, Michigan), (*Civil defense systems, *Michigan), Operations research, Recovery.

Identifiers: Postattack operations.

The volume contains the cost and effectiveness data for decontamination analyses of twelve sites and facilities in Detroit, Michigan. Costs are measured in team-hours of effort. Decontamination effectiveness is measured in terms of fractions of dose-rate remaining at specified detector locations and fractions of dose remaining for persons who perform functions requiring specified daily activity patterns at the sites and facilities chosen. (Author)

AD-635 943 **Field 6R**
CFSTI Prices: HC$1.00 MF$0.50
Zaret Foundation, Inc., Scarsdale, N. Y.
OCULAR EFFECTS OF MICROWAVE RADIATION.
Annual progress rept., 1 Sep 65-1 Jul 66.
by Milton M. Zaret. 1 Jul 66, 24p
Grant DA-MD-49-193-66-188

Descriptors: (*Microwaves, Radiation effects), (*Eye, *Radiation effects), Radiation injuries, Pathology, Health physics, Dose rate, Superhigh frequency, Edema, Etiology, Rabbits, Experimental data.

The experimental data reported represents a major accomplishment in that for the frequency used, 5500 MC/sec, it was demonstrated that lens opacification was directly related to average power density irrespective of whether the energy was in a continuous or pulsed mode of emission. By using a closed wave-guide system, it was possible to avoid all of the free-field variables of microwave radiation and to accurately determine the quantity of energy entering the eye. Comparison to a similar investigation at a different frequency (10,050 MC/sec) revealed that the lenticular effects had practically the same time-power dose relationship. The findings demonstrate not only that various microwave emission factors can be segregated and controlled but also that exact time-power relationships for cataractogenesis can be determined by biological assay. Thus, with confidence in the replicability of the exposure methodology, it is planned to obtain additional data in accordance with the experimental protocol developed for this study. (Author)

AD-636 209 **Field 6R**
CFSTI Prices: HC$2.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
RADIATION-PROTECTION AND RECOVERY FROM RADIATION INJURY IN ENDOTOXIN-TREATED MICE: HEMATOPOIETIC RECOVERY AND SENSITIVITY TO A SECOND RADIATION EXPOSURE.
by E. John Ainsworth, Kathleen Kendall, F. A. Mitchell, and Theodore L. Phillips. 22 Jul 66, 47p
USNRDL-TR-1023
NAVMED-MR005.08-5201.1

Descriptors: (*Toxins + antitoxins, Radiation injuries), (*Radiation injuries, Hemopoietic system), (*Radioprotective agents, Vaccines), Recovery, Hypoxia, Radiation effects, Hematology, Leukocytes, Bone marrow, Sublethal dosage, Pseudomonas, Salmonella, Mice.

Identifiers: Split-dose technique.

The radioprotective effects of endotoxins and the relationship between hematopoietic recovery and the rate at which the mouse returns toward a normal radiosensitivity after a conditioning exposure were evaluated. Both Pseudomonas polysaccharide (PP) and Typhoid-Paratyphoid vaccine (TAB) increased survival of irradiated mice, and the protective effect differed in two strains of mice. The protective effects of PP and hypoxia were additive and the composite protection ratio was 1.87. TAB was used in an attempt to accelerate hematopoietic recovery in sublethally irradiated mice. Although the numbers of circulating and mobilizable granulocytes were greater in TAB-treated animals than in controls during the second post-irradiation week, the TAB-treated animals did not show a more rapid recovery from radiation injury as evaluated by the split-dose technique. The numbers of circulating granulocytes may be of value in predicting the outcome of a radiation episode in terms of survival or death, but the number of granulocytes does not necessarily predict sensitivity to a second radiation exposure. (Author)

LA-3448 **Field 6R, 18I**
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., N. Mex.
GAMMA DOSE RATE MEASUREMENTS ON THE PHOEBUS 1A-321 REACTOR.
by A. J. Ahlquist, and F. W. Sanders. Dec 65, 19p

Contract W-7405-eng-36

Descriptors: (*Gamma rays, Nuclear reactors).

Identifiers: Phoebus reactor.

For abstract, see N 20 15.

N66-15916 **Field 6R**
CFSTI Prices: HC$1.00 MF$0.50
European Atomic Energy Community, Brussels (Belgium).
THE EFFECT OF VARYING THE ENVIRONMENTAL CALCIUM AND PHOSPHATE CONCENTRATIONS ON NUCLEAR DAMAGE IN X-IRRADIATED CULTURES OF BONE MARROW AND THYMUS.
by H. Brohee, J. F. Whitfield, and T. Youdale. 1965, 12p EUR-2485.E

Descriptors: *Calcium, *X-ray irradiation, *Bone marrow, *Phosphate, *Radiation effect, *Thymus.

N66-18103 **Field 6R**
CFSTI Prices: HC$1.00 MF$0.50
Cekmece Nuclear Research Center, Istanbul (Turkey).
THE EFFECT OF TRITIATED THYMIDINE AND GAMMA IRRADIATION ON THE MORTALITY OF DROSOPHILA MELANOGASTER LARVAE.
by E. Kent. Sep 64, 15p CNAEM-16
Presented at the UN Intern. Conf. on The Peaceful Uses of Atomic Energy (3rd), Geneva, Aug 31-Sep 9, 1964.

Descriptors: *Drosophila, *Radiation effect, *Gamma radiation.

N66-18133 **Field 6R**
CFSTI Prices: HC$1.00 MF$0.50
Aktiebolaget Atomenergi, Stockholm (Sweden).
REPORT ON THE PERSONNEL DOSIMETRY AT AB ATOMENERGI DURING 1964.
by K. A. Edvardsson. Jan 66, 22p AE-211

Descriptors: *Body measurement (Biol), *Dosimetry, *Radiation dose.

N66-18146 **Field 6R**
CFSTI Prices: HC$1.00 MF$0.50
European Atomic Energy Community, Brussels (Belgium).
THE RELATIONS BETWEEN LACTATE PRODUCTION, RESPIRATION AND NUCLEAR DAMAGE IN IRRADIATED RAT THYMOCYTES.
by H. Brohee, J. F. Whitfield, and T. Youdale.
Dec 65, 16p EUR-2623.E

Descriptors: *Lactate, *Nuclear effect, *Rat, *Respiration, *Animal study, *Irradiation.

PB-170 807 **Field 6R**
CFSTI Prices: HC$1.50 MF$1.25
Public Health Service, Washington, D. C. Radioactive Materials Section.
KWIC INDEX TO SELECTED RADIOACTIVE MATERIALS REFERENCES.
Mar 66, 200p RMS-66-3

Descriptors: (*Subject indexing, Radioactive isotopes), (*Radioactive isotopes, Subject indexing), Bibliographies, Radiobiology.

Identifiers: KWIC index.

UCRL-14680 **Field 6R, 18D, 20G**
CFSTI Prices: HC$2.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
HAZARDS CONTROL QUARTERLY REPORT NO. 23, OCTOBER-DECEMBER 1965 AND INDEX TO HAZARDS CONTROL QUARTERLY REPORTS NOS. 20 THROUGH 23.
1965, 46p
Contract W-7405-eng-48

Descriptors: (*Hazards, Radioactivity), (*Radioactivity, Hazards).

For abstract, see N 20 15.

BNWL-113-15 **See Field 5B**

BNWL-218 **See Field 5B**

CONF-651111 **See Field 6O**

HASL-170 **See Field 18H**

ORNL-NSIC-16 **See Field 5B**

PNE-481 **See Field 6F**

RFP-735 **See Field 18G**

6S. STRESS PHYSIOLOGY

AD-277 439 **Field 6S, 5J**
CFSTI Price: HC$4.00
Aeromedical Research Lab (6571st), Holloman AFB, N. Mex.
CHIMPANZEE PERFORMANCE DURING EXPOSURE TO 100% OXYGEN AT 14.7 PSI.
Final rept.
by Donald N. Farrer, and Herbert H. Reynolds.
Jun 62, 30p ARL-TDR-62-8
Proj. AF-6893
Task 689302

Descriptors: (*Chimpanzees, Oxygen consumption), Space simulation chambers, Tolerances (Physiology), Performance tests, Behavior, Reaction (Psychology), Reflexes, Environmental tests, Closed ecological systems, Stress (Physiology), Space medicine.

The effects on performance of breathing 100% O2 at 760 mm. Hg (14.7 psi) pressure for 15 hours were investigated using six chimpanzees in a counter-balanced design. Each subject was tested for 15 hours in both a 100% O2 environment and a 20% O2 environment. Performance on continuous and discrete avoidance tasks was required on five 15-minute sessions for each 15-hour test. The results were as follows: One subject exhibited a decrement on the continuous avoidance task; two animals showed an increase in reaction time. It was concluded that exposure to 15 hours of 100% O2 at 760 mm. Hg (14.7 psi) produced marginal performance decrements in two of the six chimpanzees. (Author)

AD-282 883 **Field 6S**
CFSTI Price: HC$1.50
Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
THE PHYSIOLOGICAL RESPONSES OF CHIMPANZEES TO SIMULATED LAUNCH AND REENTRY ACCELERATIONS.
by Norman E. Stingely. Jul 62, 50p Technical documentary rept., ARL-TDR-62-11
Proj. AF-6892
Task 689202

Descriptors: (*Space medicine, Acceleration tolerance), (*Acceleration tolerance, Chimpanzees), (*Chimpanzees, Space flight), Simulation, Atmosphere entry, Launching, Pulse rate, Respiration, Vibration, Noise, Urinary system, Cannulation, Blood vessels, Medical examination.

Five male chimpanzee subjects were exposed to simulated space flight conditions of launch acceleration and atmospheric re-entry deceleration. Heart and respiration rates showed significant differences for the three conditions of launch: launch acceleration only, launch acceleration with vibration and noise, and launch acceleration with noise, vibration, urinary tract catheterization and arterial and venous catheterizations. (Author)

AD-288 921 **Field 6S**
CFSTI Price: HC$1.50
Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
COUNTDOWN AND PROCEDURES FOR PROJECT MERCURY ATLAS-5 FLIGHT (CHIMPANZEE SUBJECT).
by Norman E. Stingely. Oct 62, 98p Technical documentary rept. ARL-TDR-62-17

Descriptors: (*Space flight, Checkout procedures), (*Chimpanzees, Space flight), (*Checkout procedures, Space medicine), Medical examination.

Identifiers: Mercury project.

The report presents the countdown and detailed procedures followed to prepare the chimpanzee subject and couch for flight in the Project Mercury capsule, and the post-flight release and care of the subject. It summarizes experiences gained during the Mercury Redstone-2 and the Mercury Atlas-5 flight programs. (Author)

AD-293 880 **Field 6S**
CFSTI Price: HC$1.50
Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
THROMBOCYTOPENIA FOLLOWING ABRUPT DECELERATION.
Preliminary communication.
by Ellis R. Taylor. Dec 62, 17p ARL-TDR-62-30
Proj. AF-7850
Task 785001

Descriptors: (*Blood platelets, Blood diseases), (*Acceleration tolerance, Blood platelets), Blood counts, Deceleration, Experimental data, Stress (Physiology).

A series of six progressively severe abrupt acceleration tests was conducted on seven human sled subjects in the forward-facing position, with the final two impacts on each subject being -20Gx peak, at an onset rate of 800 G/sec. Thrombocyte counts made before, 1 hour after and 24 hours after impact revealed a one-hour post-impact decrease of major proportion, with full recovery to mean pre-impact thrombocyte concentrations by 24 hours post-impact. An elevation of pre-impact (baseline) thrombocyte counts occurred after the first and fifth tests. Various mechanisms for this effect are presented, and areas of potential use are outlined. (Author)

AD-448 067 **Field 6S, 1B**
CFSTI Price: HC$3.00
Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
SIMULATION AND EFFECTS OF SEVERE TURBULENCE ON JET AIRLINE PILOTS.
by Stuart Ragland Jr, Randall M. Chambers, Richard J. Crosbie, and Lloyd Hitchcock Jr. 13 Aug 64, 54p NADC-ML-6411
NAVMED-MR005.13-0005.10-1

Descriptors: (*Atmospheric motion, Aviation accidents), (*Pilots, Psychomotor tests), Turbulence, Jet transport planes, Performance tests, Reaction (Psychology), Simulation, Illusions, Analysis of variance, Aviation medicine, Thunderstorms, Pitch (Motion), Roll, Perception, Vision, Acceleration, Commercial planes, Centrifuges.

The AMAL Human Centrifuge was used to simulate air turbulence conditions which had been recorded on a Boeing 720-B aircraft during severe turbulence in the cirrus portion of a thunderstorm. Techniques for simulating these conditions on the human centrifuge are reported, and the effectiveness of these simulations is evaluated. Ten commercial airline pilots, and five other volunteers flew these simulations, and the results of their evaluations of the centrifuge simulatations are reported. Significant effects on some aspects of piloting performance are reported. Effects on pitch and roll error performance, and on control stick reversals, are evaluated. The effects on visual performance, and kinesthetic sensations are reported by the pilots, are discussed. It is concluded that the human centrifuge and its computer control is an effective system for simulating the turbulence environment. (Author)

AD-635 595 **Field 6S, 5I, 6G**
CFSTI Prices: HC$1.00 MF$0.50
Naval Submarine Medical Center, Groton, Conn.
RESIDUAL NITROGEN IN MEDICAL OFFICERS PARTICIPATING IN SUBMARINE ESCAPE TRAINING.
Memo. rept.
by Lewis Terry. 2 May 66, 11p MR-66-11
NAVMED-MR005.14-3100-1.07

Descriptors: (*Officer personnel, Decompression), (*Submarine escape, *Naval training), (*Nitrogen, Tissues (Biology)), Naval personnel, Submarine personnel, Therapy, Medical personnel, Decompression sickness.

Tissue nitrogen accumulation in medical officers participating in submarine escape training is a factor that must be considered in the event that it becomes necessary for that officer to institute therapy for a training casualty. There is a tendency for tissue nitrogen to be equilibrated at a partial pressure of 36 feet of sea water. Adequate decompression of the medical officer with this tissue nitrogen accumulation is afforded by the Standard U. S. Navy Treatment Tables; however, when U. S. Navy Decompression Tables are used, it is recom-

mended that the doctor be given a residual time of 15 minutes at 165 feet. The Oxygen Treatment Tables do not compromise the decompression of the medical officer. (Author)

AD-635 599 **Field 6S**
CFSTI Prices: HC$2.00 MF$0.50
Miami Valley Hospital, Dayton, Ohio. Dept. of Research.
EVALUATION OF TECHNIQUES FOR BIOASSAY OF ERYTHROPOIETIN IN SERA OF HUMANS AND ANIMALS IN AMBIENT AND HYPEROXIC ENVIRONMENTS.
by Bernard J. Katchman, and George Beemsterboer. Dec 65, 44p
Contract AF 33 (615)-1169
Proj. AF-7164
Task 716404
AMRL-TR-65-85

Descriptors: (*Hemopoietic system, *Oxygen), Erythrocytes, Space environmental conditions, Spacecraft cabins, Biological assay, Blood serum, Radioactive isotopes, Tracer studies, Stress (Physiology), Iron, Hypoxia, Neuraminic acids, Humans, Dogs, Rats.

Identifiers: Hyperoxia.

The regulation of erythropoiesis by blood pO2 is of direct consequence to any evaluation of the suitability of higher than ambient O2 partial pressures in space cabin environments. Alterations in serum erythropoiesis stimulating factor (ESF) of individuals exposed to space cabin environments for long periods of time may have clinical consequences. Four methods for the assay of serum ESF were evaluated, and of these, only the hypoxia-induced polycythemic bioassay rat proved to be sensitive enough to detect ESF in 2 ml of serum. Serum ESF is related to that fraction of a dose of Fe59, injected into the bioassay rat, which appears in the red blood cells after twenty-four hours. Endogenous ESF causes Fe59 uptakes of 6.4 plus or minus 3.9%; 2 ml of human serum causes Fe59 uptakes of 15.4 plus or minus 6.8%, which are statistically significant from the controls. Variances in duplicates are such that to distinguish between two samples at the 95% confidence interval, the samples must differ from each other by about 50% in ESF content. Although statistically significant changes in blood ESF were found, both in animals and humans exposed to 100% O2, the physiological significance of these changes is unexplained due to the paucity of data. The unique discovery that neuramin lactose, neuraminic acid, and beta-lactose stimulate Fe59 uptake into red blood cells would indicate that the parameters which control incorporation of iron into red blood cells need further definition. (Author)

AD-635 609 **Field 6S**
CFSTI Prices: HC$1.00 MF$0.50
Rutgers - The State Univ., New Brunswick, N. J. Dept. of Physiology and Biochemistry.
SERUM LIPIDS AND BLOOD KETONES DURING PROGRESSIVE HYPERTHERMIA.
Rept. for Feb-Oct 65.
by H. M. Frankel, and D. W. Frascella Jr. May 66, 10p
Contract AF 41 (609)-2635
Proj. AF-7758
Task 775801
SAM-TR-66-47

Descriptors: (*Fevers, Blood chemistry), (*Metabolism, Fevers), Lipids, Ketones, Fatty acids, Acetates, Acetones, Lactates, Body temperature, Tolerances (Physiology), Stress (Physiology), Cats.

Identifiers: Hydroxybutyrates.

Serum total lipid and total fatty acids and blood acetone-acetoacetate and beta-hydroxybutyrate were determined in cats at normal body temperature (Tr) and Tr's of 40C., 42C., and 44C. Total lipid and total fatty acids decreased with increased body temperature. Ketones did not change significantly. It is suggested the decrease in serum fats may result, in part, from increases that occur in blood lactates during hyperthermia. (Author)

AD-635 611 **Field 6S, 6T**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB.
PRELIMINARY OBSERVATIONS ON TESTICULAR FUNCTION IN ROOSTERS AND MICE EXPOSED TO INCREASED PARTIAL PRESSURE OF OXYGEN.
Rept. for Mar 64-Apr 65.
by Frode Ulvedal. Apr 66, 17p SAM-TR-66-40
Task 793002

Descriptors: (*Reproductive system, High-pressure research), (*Oxygen, Toxicity), Testes, High altitude, Stress (Physiology), Tolerances (Physiology), Sex glands, Pathology, Histology, Pressure, Chickens, Mice.

Identifiers: Hyperoxia, Spermatozoa.

Adult White Leghorn roosters were exposed to 100% oxygen atmospheres at 258 and 380 mm. Hg pressure for 31 and 22 days, respectively. A ground-level control experiment was also performed. Ejaculates were obtained twice weekly by the massage technic and the ejaculate volume, total sperm count, and sperm motility were measured. The results show that confinement to the chamber for 58 days (ground-level control experiment) and exposure to 100% oxygen at 258 mm. Hg pressure for 31 days had essentially no effect on the three variables studied. The ejaculate volume, sperm motility, and total sperm count decreased significantly, however, in roosters exposed to 100% oxygen at 380 mm. Hg; the decrease in the three variables occurred during the first 4 to 7 days. Otherwise, the birds remained apparently healthy throughout the experiments. Histologic examinations were made on the testes after a 30-day recovery period. Size and weight of the testes from the 380 mm. Hg oxygen group were also reduced as compared to controls. Previously, the reproductive capabilities of male and female mice investigated at higher partial pressures were found to be adversely affected. (Author)

AD-635 982 **Field 6S**
CFSTI Prices: HC$5.60 MF$0.50
Institute of Occupational Health, Helsinki (Finland). Dept. of Physiology.
THE EFFECTS OF EXPOSURES TO EXTREMELY HOT ENVIRONMENTS ON THE TEMPERATURES MEASURED AT THE TYMPANIC MEMBRANE, IN THE OESOPHAGUS AND IN THE RECTUM OF MEN.
Technical rept.
by Pekka Piironen. 28 Feb 63, 52p
Grant AF-EOAR-62-31

Descriptors: (*Body temperature, *Heat tolerance), Esophagus, Ear, Thermal conductivity, Acclimatization, Exposure, Environment, Adaptation (Physiology), Blood, Blood circulation, Heat production (Biology), Mathematical models, Skin, Tables, Finland.

Identifiers: Rectum, Thermoregulation.

The responses of the oesophageal, tympanic, and rectal temperatures of resting nude human subjects were investigated in different thermal environments ranging from 50 to 130C (120 to 265F); changes in temperatures in the oesophagus and at the tympanic membrane appeared rapidly, were linear and of equal magnitude. They were considered to follow closely the blood temperature in the central circulation. The simultaneous changes in the rectal temperature were slow and irregular. (Author)

N66-12177 **Field 6S**
CFSTI Prices: HC$1.00 MF$0.50
Naval School of Aviation Medicine, Pensacola, Fla.
EFFECTS OF PROLONGED CALORIC STIMULATION UPON OCULOMOTOR, VESTIBULOSPINAL, AND SEGMENTAL SPINAL ACTIVITY.
by H. W. Ades, B. E. Gernandt, and M. Igarashi. 24 Jun 65, 19p NSAM-934
Contract NASA Order-R-93
NASA-CR-68266

Descriptors: *Monkey, *Thermal agitation, *Vestibular effect, *Eye movement, *Spinal cord.

For abstract, see T 66 17.

N66-15435 **Field 6S**
CFSTI Prices: HC$2.00 MF$0.50
Naval School of Aviation Medicine, Pensacola, Fla.
THE EFFECTS OF VISUAL DEPRIVATION ON ADAPTATION TO A ROTATING ENVIRONMENT.
by A. Graybiel, R. S. Kennedy, and R. L. Tolliver. 18 Mar 65, 43p Rept. no. 106, NSAM-918
Contract NASA Order-R-93
NASA-CR-69359

Descriptors: *Adaptation, *Transfer of training, *Rotating environment, *Sensory deprivation, *Visual control.

N66-15983 **Field 6S**
CFSTI Prices: HC$2.00 MF$0.50
Naval School of Aviation Medicine, Pensacola, Fla.
THE DIAL TEST-A STANDARDIZED PROCEDURE FOR THE EXPERIMENTAL PRODUCTION OF CANAL SICKNESS SYMPTOMATOLOGY IN A ROTATING ENVIRONMENT.
by A. Graybiel, and R. S. Kennedy. 10 Jun 65, 33p NSAM-930
Contract NASA-Order-R-93
NASA-CR-69664

Descriptors: *Motion sickness, *Rotating environment, *Semicircular canal, *Aerospace medicine, *Coriolis effect.

N66-16106 **Field 6S**
CFSTI Price: MF$2.00
Naval School of Aviation Medicine, Pensacola, Fla.
THE ROLE OF THE VESTIBULAR ORGANS IN THE EXPLORATION OF SPACE.
1965, 376p
NASA-SP-77
Presented at Symp. Held in Pensacola, Fla., Jan 20-22 1965. Available from Superintendent of Documents, GPO, Washington, D.C. 20402, HC $2.25.

Descriptors: *Aerospace medicine, *Conference, *Space exploration, *Vestibular apparatus, *Otolith, *Semicircular canal.

N66-18432 **Field 6S**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Houston, Tex. Manned Spacecraft Center.
EFFECTS OF LOW FREQUENCY PRESSURE FLUCTUATIONS ON HUMAN SUBJECTS.
by J. Billingham, W. E. Feddersen, B. O. French, R. O. Mc Brayer, and G. J. Pesman. Mar 66, 29p
NASA-TN-D-3323

Descriptors: Physiological response, *Pressure oscillation, *Human reaction, *Psychophysiology.

6T. TOXICOLOGY

AD-635 680 **Field 6T**
CFSTI Prices: HC$1.00 MF$0.50
Pennsylvania Hospital, Philadelphia.
BIOCHEMISTRY AND MECHANISM OF ACTION OF TOXIC PROTEINS.

Annual progress rept. 1 Jul 65-30 Jun 66.
by Sumner I. Zacks, and Michael F. Sheff. 30 Jun 66, 12p
Contract DA-18-035-AMC-143A

Descriptors: (*Clostridium botulinum, Toxins + antitoxins), (*Toxins + antitoxins, Biochemistry), Toxicity, Labeled substances, Fluorescent antibody techniques, Clostridium tetani, Electrophoresis, Morphology (Biology), Muscles, Electron microscopy, Cytology, Tissues (Biology), Gastrointestinal system, In vivo analysis, In vitro analysis, Paralysis, Brain, Detoxification, Dosage, Genetics, Resistance (Biological), Mice.

Contents: Preparation of toxin for binding studies; fluorescent toxin--immunochemical studies; studies with ferritin-labelled botulinus toxin; lead binding by motor endplates; local botulism; acute and chronic intoxication; absorption studies from the gastrointestinal tract; nervous tissue binding of botulinus toxin; genetic resistance to botulinus toxin in mice.

AD-635 611 See Field 6S

7. CHEMISTRY

BNWL-113-15 See Field 5B

7A. CHEMICAL ENGINEERING

AD-635 836 **Field 7A, 7E, 18D**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
OUTLOOK FOR THE INTRODUCTION OF RADIOACTIVE DENSIMETERS OF LIQUID INTO THE INDUSTRY OF ORGANIC SYNTHESIS.
by M. A. Veksler, K. S. Furman, and G. A. Mukhin. 25 May 66, 13p FTD-TT-65-1668
TT-66-61795
Unedited rough draft trans. of mono. Radioaktivnye Izotopy i Yadernye Izlucheniya v Narodnom Khozyzystve SSSR, Moscow, 1961 p257-62.

Descriptors: (*Nuclear industrial applications, Chemical industry), (*Densimeters, Nuclear industrial applications), Organic chemicals, Synthesis (Chemistry), Monitors, Gamma rays, USSR.

Results are given of tests of a gamma-emitting densimeter for monitoring liquids.

IDO-14661 **Field 7A, 18G, 18I**
CFSTI Prices: HC$4.00 MF$0.75
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
CHEMICAL AND PROCESS DEVELOPMENT BRANCH ANNUAL REPORT, FISCAL YEAR 1965.
by J. R. Bower. Feb 66, 115p
Contract AT (10-1)-205

Descriptors: (*Chemical engineering, Nuclear engineering), (*Reactor fuel processing, Analysis).

For abstract, see N 20 15.

ORNL-3952 **Field 7A, 18J**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge National Lab., Tenn.
EXPERIMENTAL SURVEY OF CLOSE-COUPLED PROCESSING METHODS FOR FUELS CONTAINING URANIUM AND THORIUM.
by L. M. Ferris. Jun 66, 34p
Contract W-7405-eng-26

Descriptors: (*Reactor fuel processing, Experimental data).

For abstract, see N 20 15.

ORNL-3962 **Field 7A, 18I, 18L**
CFSTI Prices: HC$3.00 MF$0.75
Oak Ridge National Lab., Tenn.
ABSTRACTS OF PAPERS, WATER DESALINATION INFORMATION MEETING, MAY 10-11, 1966.
by K. A. Kraus, and R. P. Hammond. 1966, 66p
Contract W-7405-eng-26

Descriptors: (*Sea water, Desalination), (*Desalination, Sea water).

For abstract, see N 20 15.

BNWL-218 See Field 5B

K-1666 See Field 7B

ORNL-3943 See Field 18J

PB-170 631 See Field 11F

PB-170 700 See Field 13B

PB-170 795 See Field 5B

7B. INORGANIC CHEMISTRY

AD-460 679 **Field 7B**
CFSTI Price: HC$4.00
Royal Aircraft Establishment, Farnborough (England).
ELECTROMETRIC METHODS OF END-POINT INDICATION FOR THE ARGENTOMETRIC TITRATION OF MICROGRAM AMOUNTS OF CHLORIDE.
by J. R. Webb. Jan 65, 24p Technical rept. TR-65003

Descriptors: (*Chlorides, Volumetric analysis), (*Volumetric analysis, Chlorides), Electrochemistry, Silver compounds, Nitrates, Polarographic analysis, Great Britain.

Identifiers: Potentiometric titration, Silver nitrate.

Potentiometry, a polarisation end-point method and differential electrolytic potentiometry were investigated for sensitivity of end-point indication for the routine argentometric determination of up to 50 micrograms of chloride ion. A small volume and high acetone concentration were necessary for optimum indication by the three methods. Potentiometry and differential electrolytic potentiometry required ca 30 min for a titration; polarisation end-point required ca 10 min. End-points were clearly indicated without plotting curves to plus or minus 0.07 micrograms with 0.004N silver titrate as titrant. (Author)

AD-636 054 **Field 7B, 20B**
CFSTI Prices: HC$2.00 MF$0.50
Pennsylvania State Univ., University Park. Materials Research Lab.
CRYSTAL CHEMISTRY STUDIES.
Quarterly technical rept. no. 4, 14 Feb-13 May 66.
by Rustum Roy, G. J. McCarthy, O. Muller, and W. B. White. Jul 66, 48p
Contract DA-28-043-AMC-01304 (E)
Proj. DA-1C0-14501-B13A
ECOM-01304-4
See also AD-631 987.

Descriptors: (*Crystals, Chemical properties), (*Rare earth compounds, Chemistry), (*Rhenium compounds, Complex compounds), (*Samarium compounds, Silicates), Oxides, Rare earths, Synthesis (Chemistry), Chemical analysis, X-ray diffraction analysis, Crystallography, Band spectrum.

Work was focused on the crystal chemistry of a family of rare earth-rhenium compounds. The work was completed and is presented in complete manuscript form as an appendix. The study of divalent rare earth compounds continued. The samarium silicate described in the last report was definitely identified and is described in detail. Attention has now been turned to the EuO-CaO-O System. (Author)

K-1666 **Field 7B, 7E, 7A**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge Gaseous Diffusion Plant, Tenn.
REMOVAL OF IMPURITIES FROM URANIUM HEXAFLUORIDE BY SELECTIVE SORPTION TECHNIQUES.
by D. C. Brater, H. L. Kaufman, and J. H. Pashley. 6 Jun 66, 43p
Contract W-7405-eng-26

Descriptors: (*Uranium compounds, Fluorides), (*Sorption, Impurities), (*Reactor fuels, Impurities).

For abstract, see N 20 15.

LA-3473 **Field 7B**
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., N. Mex.
THE SCANDIUM-HYDROGEN SYSTEM.
by J. F. Stampfer Jr. Jan 66, 28p
Contract W-7405-eng-36

Descriptors: (*Hydrogen, Chemical reactions), (*Scandium, Chemical reactions).

For abstract, see N 20 15.

PB-170 653 **Field 7B, 7E, 18J**
CFSTI Prices: HC$1.50 MF$0.50
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
DOSAGE DU CARBONE PAR COULOMETRIE DANS LE PLUTONIUM ET LES ALLIAGES URANIUM-MOLYBDENE (Coulometric determination of Carbon in Plutonium and in Uranium-Molybdenum Alloys).
by Bernard Pichotin, and Philippe Chasseur. 1966, 21p CEA-R-2968
Text in French; attached summary in English.

Descriptors: (*Carbon, Chemical analysis), (*Plutonium, Chemical analysis), (*Uranium alloys, Chemical analysis), (*Molybdenum alloys, Chemical analysis), Electrochemistry, Volumetric analysis, Reactor fuels, Impurities, France.

Identifiers: Coulometric titration.

A coulometric method to determine the carbon is described. This method is speedy and sensitive. One determination is executed in 10 mm for uranium or alloys and in 45 mn for plutonium and alloys. The limit of sensitivity is about 5 ppm for a sample of 1 g. (Author)

AD-635 586 See Field 7D

AD-635 652 See Field 7D

AD-635 678 See Field 7D

BNWL-218 See Field 5B

PB-170 540 See Field 8D

PB-170 654 See Field 7C

PB-170 795 See Field 5B

7C. ORGANIC CHEMISTRY

AD-468 940 **Field 7C, 11I, 7D**
CFSTI Prices: HC$3.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England)
THE INFLUENCE OF COHESIVE FORCES ON THE GLASS TRANSITION TEMPERATURES OF POLYMERS.
by W. A. Lee, and J. H. Sewell. Jun 65, 27p
Technical rept. TR-65112

Descriptors: (*Polymers, Transition temperature), Glass, Molecular association, Density, Energy, Great Britain.

The relationship between cohesive energy (c.e.) or cohesive energy density (c.e.d.) and the glass transition temperature (TG) of polymers was reexamined on the basis of literature data. For polymers with TG's above 25C, there is no correlation between published or calculated values of c. e.or c.e.d. and TG. However, for the rest of the polymers there is a linear relationship between c.e.d. and TG, and a broad relationship between c.e. and TG. These results imply that c.e.d. is the regulating, though not the only, factor in determining TG's up to values of approximately 25C. (Author)

AD-635 898 **Field 7C, 6A, 6D**
CFSTI Prices: HC$3.00 MF$0.75
Woods Hole Oceanographic Institution, Mass.
OCCURRENCE OF NORMAL PARAFFIN HYDROCARBONS IN NATURE. TABLES AND BIBLIOGRAPHY.
Technical rept.
by Robert C. Clark Jr. Jul 66, 59p WHOI-Ref-66-34
Contract Nonr-2196 (00), Grant NSF-GP-3250
Proj. NR-083-004

Descriptors: (*Hydrocarbons, Distribution), (*Alkanes, Distribution), Aliphatic compounds, Plants (Botany), Animals, Aquatic animals, Plankton, Geology, Atmosphere, Petroleum, Tables, Bibliographies.

Tables are given which indicate the occurrence and, where available, the content of n-alkanes in land and marine plants, land and marine animals, the atmosphere, and (to a lesser extent) the earth's crust. A supporting bibliography of 444 items is included.

AD-636 161 **Field 7C**
CFSTI Prices: HC$1.00 MF$0.50
Consejo Superior de Investigaciones Cientificas, Barcelona (Spain). Departmento de Quimca Organica.
SYNTHESIS AND PROPERTIES OF ALKAROMATIC CHLOROCARBONS.
Annual summary rept., 1 Nov 64-31 Oct 65.
by Manuel Ballester. Apr 66, 21p
Contract AF 61 (052)-749
Proj. AF-7023
ARL-66-0070

Descriptors: (*Halogenated hydrocarbons, Synthesis (Chemistry)), (*Chlorine compounds, Halogenated hydrocarbons), Aromatic compounds, Free radicals, Stereochemistry, Chemical reactions, Electron spin resonance, Spain.

Progress in the alkaromatic chlorocarbons is summarized, including informational exchanges, papers presented and published, and patent history. Recent data obtained from the synthesis and reactivity studies on the new class of inert perchlorocarbon free radicals are described. These include results obtained with perchlorodiphenylmethyl, perchlorotriphenylmethyl, perchloro-4-phenyldiphenylmethyl, perchloro-4-phenyltriphenylmethyl, perchloro-alpha, alpha, alpha, alpha,-tetraphenyl-bi-p-tolyl-alpha, alpha-ylene diradical, alpha-H, alpha-H, alpha-H-tetradecachloro-4-methyltriphenylmethyl radicals and related compounds. These radicals are chemically inert to oxygen and halogens, due principally to steric hindrance, but give sharp electron spin resonance lines. (Author)

AD-636 217 **Field 7C, 11J**
CFSTI Prices: HC$4.00 MF$0.75
Colorado Univ., Boulder.
THE SYNTHESIS OF SPECIAL FLUORINE-CONTAINING MONOMERS.
Final rept., 1 Oct 63-1 Oct 65.
by J. D. Park, and J. R. Lacher. Jan 66, 117p
Contract DA-19-129-QM-1926
Proj. DA-1C024401A329
C/OM-17, USA-NLABS-66-54-CM

Descriptors: (*Elastomers, Fluorine compounds), (*Halogenated hydrocarbons, Synthesis (Chemistry)), (*Fluorine compounds, Synthesis (Chemistry)), Polycyclic compounds, Grignard reactions, Pyrolysis, Cyclobutenes, Bromine compounds, Chlorine compounds, Iodine compounds, Dienes.

A large number of fluorine containing intermediates were synthesized and shipped for further polymer studies. Among the organic fluorine compounds synthesized were: (a) various bicyclobutenyl derivatives (b) Grignard reaction products and pyrolysis materials obtained therefrom (c) unsaturated fluorine-containing halogenated (Br, Cl, I) cyclobutenes and (d) various alpha, omega-diolefins. Most of the above compounds were new to the arts. (Author)

AD-636 269 **Field 7C**
CFSTI Prices: HC$2.00 MF$0.50
London Univ. (England).
RESEARCH ON SILICON AND PHOSPHORUS DERIVATIVES OF VARIOUS NITROGEN COMPOUNDS.
Summary technical rept., Jan 61-Jan 62.
by Robert A. Shaw. May 66, 30p
Contract AF 61 (052)-175
Proj. AF-7023
Task 73666
ASD-TR-61-305-Pt-2

Descriptors: (*Organic nitrogen compounds, Chemical reactions), (*Triazines, Chemical reactions), (*Organic phosphorus compounds, Synthesis (Chemistry)), (*Silanes, Synthesis (Chemistry)), Chlorides, N-heterocyclic compounds, Phosphites, Sulfides, Selenides, Amines, Metalorganic compounds, Lithium compounds, Great Britain.

Identifiers: Cyanuric chloride, Dichloro ethylanilino triazines, Phosphonato triazines, Silylamines.

Reactions of cyanuric chloride with trialkyl phosphites, diphenyl alkyl phosphites, triphenyl phosphite and diethylaniline are reported. Preparations and properties of 2, 4, 6-tris (iphenylphosphino)-s-triazine were investigated. New derivatives of hexamethyldisilazyl-lithium were prepared. (Author)

AI-CE-15 **Field 7C, 7E, 18I**
CFSTI Prices: HC$3.00 MF$0.50
Atomics International, Canoga Park, Calif.
HEAVY WATER ORGANIC COOLED REACTOR. PHYSICAL PROPERTIES OF SOME POLYPHENYL COOLANTS.
by H. Mandel. 15 Apr 66, 46p
Contract AT (38-1)-430
Prepared in cooperation with Combustion Engineering, Inc., Windsor, Conn. Nuclear Div.

Descriptors: (*Reactor coolants, Physical properties).

For abstract, see N 20 15.

N66-15422 **Field 7C**
CFSTI Prices: HC$1.00 MF$0.50
Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Chemistry.
TIME-DEPENDENT REACTIONS OF THE CRYSTALLIZING AND SOLIDIFYING OF LINEAR HIGH POLYMERS.
by B. Wunderlich. 1965, 8p
Grant NsG-100
NASA-CR-60393

Descriptors: *Crystal growth, *Polyethylene, *Polymer chemistry, *Thermostability.

PB-170 654 **Field 7C, 18J, 7E, 7B**
CFSTI Prices: HC$4.00 MF$0.75
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
FIXATION D'ACETATES METALLIQUES DANS UNE RESINE ECHANGEUSE D'ANIONS (Fixing of Metallic Acetates on an Anion-Exchange Resin).
by Michele Brigaudeau-Vaissiere. 1966, 68p
CEA-R-2994
Text in French; attached summary in English.

Descriptors: (*Acetates, Ion exchange), (*Uranyl radicals, Acetates), (*Uranium, Separation), (*Ion exchange, Uranyl radicals), Complex compounds, Reaction kinetics, Dissociation, Mercury compounds, Copper compounds, Alcohols, Ion exchange resins, France.

Identifiers: Cupric acetate, Mercuric acetate, Uranyl acetate.

After giving a brief review of the theoretical principles governing the fixation of anionic complexes of metallic elements on an anion exchange resin, consideration is given to the particular case of uranyl acetate. The exchange constants in the resin and the dissociation constants for the complexes in solution were calculated. The fixation of a large number of metallic acetates were studied. All the tests were negative except in the case of mercury. For this reason the possibility of separating uranium from a certain number of elements was considered. Some of these separations are possible even in the presence of interfering anions such as chlorides which have a greater affinity for the resin than have the acetate ions. In the case of water-ethanol and water-isopropanol mixtures, the conditions under which copper acetate and mercury acetate may be fixed were improved. This study permitted the calculation of the dissociation constant for the CuAc3 (-) complex in the mixtures water + 40% (by weight) isopropanol, and water + 50% (by weight) isopropanol. It should also make it possible to use separation conditions which could not hitherto be applied in aqueous media. (Author)

AD-292 260 **See Field 6O**

AD-482 416 **See Field 11H**

AD-482 753 **See Field 11K**

AD-635 579 **See Field 7D**

AD-636 100 **See Field 11A**

AD-636 141 **See Field 11I**

AD-636 184 **See Field 20I**

PB-170 795 **See Field 5B**

7D. PHYSICAL CHEMISTRY

AD-635 569 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Fluid Mechanics Lab.
GENERALIZED DIFFUSION THEORY OF NONEQUILIBRIUM REACTION RATES.
by James C. Keck. May 66, 12p Pub-66-2
Contract Nonr-1841 (93)

Descriptors: (*Reaction kinetics, Theory), (*Diffusion, Reaction kinetics), Relaxation time, Equations, Atoms, Thermodynamics.

A simple expansion procedure is used to show that the master equation describing the relaxation of an atomic system in a background of inert atoms can be approximated by a generalized diffusion equation with appropriate boundary conditions. This diffusion equation is equivalent to one previously derived by Van Kampen and implies the phenomenological equations of nonequilibrium thermodynamics. (Author)

AD-635 579 Field 7D, 20B, 7C
CFSTI Prices: HC$1.00 MF$0.50
University of Southern California, Los Angeles.
INFRARED SPECTRA OF MOLECULAR CRYSTALS.
Final technical rept.
by David A. Dows, G. Audermann, L. Rubenstein, and N. Rich. 31 May 66, 14p
Contract AF 49 (638)-1308
Proj. AF-9760
Task 976001
AFOSR-66-1416
Continuation of Grant AF-AFOSR-62-165.

Descriptors: (*Infrared spectroscopy, *Crystals), Reflection, Absorption spectrum, Intensity, Molecular association, Crystal lattices, Phase studies, Crystal structure, Molecular structure, Polycyclic compounds.

Identifiers: Adamantane.

Studies were carried out to characterize and explain the infrared absorption and reflectance spectra of molecular crystals. Accurate methods of measuring reflectance spectra and of processing the data to obtain optical constants were developed and applied to sodium chlorate. Absolute infrared absorption intensities were measured for ethylenes, benzenes, acetylene and ethane. Theoretical studies of crystal splitting and lattice frequencies in benzene have provided data concerning intermolecular forces in this crystal splitting of ungerade vibrations, and provide the restoring force for torsional lattice motion. Phase changes in adamantane, cyclohexane and hexamethylbenzene were studied. Spectroscopically observable changes occuring at the phase transition temperature yield information concerning the molecular motions. Crystal spectra were used to aid in vibrational assignment of hydrazoic acid and cyclohexane. The unique properties of the crystal spectrum were of critical value in each case. (Author)

AD-635 586 Field 7D, 7B, 11I
CFSTI Prices: HC$3.00 MF$0.50
California Univ., Los Angeles. Dept. of Chemistry.
MOLECULAR FLOW AND LANTHANUM CATALYZED BOND INTERCHANGE IN SODIUM PHOSPHATE POLYMERS.
Technical rept.
by Adi Eisenberg, and Shogo Saito. Jun 66, 31p TR-12
Contract Nonr-233 (87)
Proj. NR-051-453
Paper no. 6 on the Viscoelastic Relaxation Mechanisms in Inorganic Polymers.

Descriptors: (*Inorganic polymers, *Phosphates), (*Sodium compounds, Phosphates), (*Lanthanum, Catalysis), Molecular properties, Viscoelasticity, Rheology, Chemical bonds, Heat of activation, Crosslinking (Chemistry).

Identifiers: Sodium phosphates.

It is observed that sodium phosphate polymers, in which some of the Na (+) ions have been replaced by La (+++)ions, are subject to both simple molecular flow and to bond interchange in the glass transition region. These two relaxation mechanisms are separated, and their relative contributions to the shear viscosity are calculated. It is shown that the bond interchange mechanism is subject to an activation energy of ca. 50 Kcal, while that of the molecular flow is of the order of 200 Kcal at Tg + 30C; the latter is of the WLF form. It is further shown that the La (+++) ions act as crosslinks, at least at low concentrations, and that the bond interchange occurs at the site of the La (+++) ions, rather than at random along the polymer chain. (Author)

AD-635 652 Field 7D, 7B, 20L
CFSTI Prices: HC$1.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y.
HIGH PRESSURE CHEMISTRY AND STRUCTURE.
Progress rept. no. 5, 1 Oct 65-31 Mar 66.
by E. Banks, and B. Post. 31 Mar 66, 9p
Contract DA-31-124-ARO (D)-70
Proj. DA-20010501-B700

Descriptors: (*High-pressure research, Chemistry), (*Phase studies, High-pressure research), (*Crystal structure, High-pressure research), X-ray diffraction patterns, Differential thermal analysis, Compressive properties, Rare earth compounds, Intermetallic compounds, Aluminum compounds, Nitrides, Tungsten compounds, Oxides, Lithium compounds, Tungstates, Niobium compounds, Fluorides, Europium compounds, Niobates, Synthesis (Chemistry).

Identifiers: Aluminum nitride, Europium niobates, Lithium fluoroniobate, Niobium Dioxide, Tungsten bronzes, Tungsten trioxide.

Progress is reported in the following areas: Calibration and operation of a high-pressure x-ray camera; Development of a high-pressure differential thermal analysis technique; Phase studies and syntheses of intermetallic rare-earth compounds, aluminum nitride, and the oxides WO3, Li-xWO-3 (where x = 0.4-0.5), NbO2, LiNbO2F, and EuNbO3.

AD-635 678 Field 7D, 7B
CFSTI Prices: HC$1.00 MF$0.50
Utah State Univ., Logan. Dept. of Chemistry.
INFRARED SPECTRA OF HIGH-BOILING SUBSTANCES IN INERT MATRICES.
Final technical rept., 1 Jan 65-30 Jun 66.
by Richard L. Redington. 30 Jun 66, 20p
Contracts DA-31-124-ARO (D)-283, DA-31-124-ARO (D)-39
Proj. CRD-AA-IP-3895-3
AROD-5272.3

Descriptors: (*Infrared spectroscopy, Halides), (*Alkali metal compounds, Spectra (Infrared)), (*Cryogenics, Infrared spectroscopy), Lithium compounds, Fluorides, Water, Sulfur compounds, Oxyfluorides, Electric moments, Band spectrum, Solidified gases.

Identifiers: Lithium fluoride, Matrix isolation techniques, Sulfur tetrafluoride, Thionyl fluoride.

The primary purpose of the research was to study the nature of matrix isolated monomeric and low polymeric alkali halide species. In these experiments, the vapor above molten alkali halide samples was isolated at liquid He temperature in an excess of a rare gas or other matrix material. The infrared spectrum was then recorded. The plan was to study the structure or symmetry of the trapped species, determine their force constants, and in some cases establish their very existence. In addition, the interaction of the trapped species with the matrix host was of fundamental importance. A number of other studies which proceeded as out-growths from the above primary objectives are described. (Author)

AD-635 760 Field 7D, 3A, 20I
CFSTI Prices: HC$1.00 MF$0.50
Harvard Coll. Observatory, Cambridge, Mass.
ON THE 6s6p (2) DOUBLET-S1/2 LEVEL AND THE CONFIGURATION-MIXING OF THE 6s6p (2) QUADRUPLET-P3/2 LEVEL IN Tl I.
by W. R. S. Garton, W. H. Parkinson, and E. M. Reeves. May 66, 16p Scientific-11
Contract Nonr-1866 (48), Grant NsG-438

Descriptors: (*Tellurium, *Atomic energy levels), Vapors, Absorption spectrum, Shock waves, Ionization, Plasma medium, Nuclear resonance, Theory.

Experiments on the absorption spectrum of shock-heated Tl vapour revealed a new Tl I doublet (6 doublet-P (0)1/2, 3/2 - 6s6p (2) doublet - S1/2). The profile of the Tl I (6 doublet-P (0)1/2 - 6s6p (2) quadruplet-P3/2) autoionization feature was obtained by experiments with a furnace and scanning monochromator, and the result is compared with the theory of 'Beutler-Fano' resonances. (Author)

AD-635 801 Field 7D
CFSTI Prices: HC$1.00 MF$0.50
New York Univ., N. Y. Dept. of Chemistry.
RELAXATION ELECTRODE PROCESSES WITHOUT A PRIORI SEPARATION OF DOUBLE LAYER CHARGING.
Technical rept.
by Gilles G. Susbielles, and Paul Delahay. Jun 66, 24p TR-2
Contract Nonr-285 (65)
Proj. RR-001-01-01

Descriptors: (*Electrodes, Reaction kinetics), Electrostatics, Equations, Relaxation time, Electrical double layer, Boundary value problems, Approximation (Mathematics).

Theory of relaxation electrode processes is developed on the basis of three, previously reported, general equations for a linearized current-overvoltage characteristic and for the following perturbations: single step galvanostatic, double step galvanostatic, coulostatic decay with charge injection either by a square current pulse of a delta-function pulse, and single step potentiostatic. Results are compared with earlier results derived on the assumption of a priori separation of faradaic and charging processes. The error on kinetic parameters that affects some earlier results can be serious. Methods for analysis of experimental results are described for each method and for combinations of methods. Numerical examples are given. (Author)

AD-635 804 Field 7D
CFSTI Prices: HC$1.00 MF$0.50
Noyes Chemical Lab. Univ. of Illinois, Urbana.
ANALYSIS OF NMR SPECTRA BY MEANS OF DOUBLE RESONANCE DATA.
Technical rept.
by Eugene F. Friedman, and H. S. Gutowsky. 13 Apr 66, 7p TR-90
Contract Nonr-1834 (13)
Proj. NR-051-215
Prepared for pub. in the Journal of Chemical Physics.

Descriptors: (*Nuclear magnetic resonance, Analysis), Spectroscopy, Nuclear energy levels, Nuclear spins.

The simplest case for which the detailed analysis of the high-resolution nmr spectrum is not trivial is an AMX system of spin-1/2 nuclei. Double resonance (DR) experiments are useful in the analysis. However, the methods reported previously for employing the results of decoupling or tickling experiments on such systems require some care to insure that all but the correct assignment have been eliminated. This note describes and proves the validity of a simple mnemonic method for establishing the relative signs of the coupling constants in an AMX system from DR data. (Author)

AD-635 825 Field 7D, 21I
CFSTI Prices: HC$1.00 MF$0.50
National Research Corp., Cambridge, Mass. Norton Exploratory Research Div.
THERMOCHEMISTRY OF SELECTED COMPOUNDS.
Quarterly letter rept. 15 Feb-15 May 66.
by Ludwig G. Fasolino. 15 Jun 66, 5p
Contract Nonr-3608 (00)
See also AD-631 265.

Descriptors: (*Solid rocket propellants, Thermochemistry), (*Thermochemistry, Aluminum compounds), (*Aluminum compounds, Borohydrides), (*Borohydrides, Hydrolysis),

Water, Heat of reactions, Experimental data, Errors, Laboratory equipment.

Identifiers: Aluminum borohydride.

Hydrolysis studies of aluminum borohydride were continued and an attempt was made to locate the source of the contributing factor which resulted in the scatter of the heat data. It is felt that the main factor was the lack of proper control of the jacket temperature which is held at 2C. Measures were taken to monitor and to correct the deviation of this temperature from a fixed setting. Much less scatter was evident from the results of the more recent runs following the new modifications beginning to see much less scatter. It is, therefore, expected that future runs to also exhibit this same degree of precision.

AD-636 109 **Field 7D**
CFSTI Prices: HC$12.60 MF$0.75
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
THE ULTRA VIOLET BANDS OF OH. FUNDAMENTAL DATA.
by G. H. Dieke, and H. M. Crosswhite. Nov 48, 126p Bumblebee-87
Contract NOrd-8036

Descriptors: (*Ultraviolet spectroscopy, *Hydroxides), Infrared spectroscopy, Tables, Temperature, Spectra (Infrared), Spectra (Visible ; ultraviolet), Band spectrum, Molecular energy levels.

Identifiers: BUMBLEBEE Project.

A new survey of OH bands is presented. This consists of new measurements of the whole wavelength region 2800-3550A which are believed to be more complete and more accurate than what was hitherto available. A revised analysis and classification of nine bands. New intensity determinations and a location of all blends which may give rise to trouble in temperature measurements. A recalculation of all band constants. A calculation and tabulation of rotational transition probabilities necessary for the applications. A table of the rotational and vibrational energy levels. A presentation of a simplified method for routine temperature measurements and tables for its use. A table of the infrared bands of OH as calculated from the data obtained from the ultra violet bands. (Author)

AD-636 157 **Field 7D, 20M**
CFSTI Prices: HC$3.00 MF$0.75
Naval Academy, Annapolis, Md. Dept. of Engineering.
A THEORY OF CONDENSATION AND EVAPORATION OF AEROSOLS.
Technical rept.
by Ernest R. Buckle. May 66, 65p TR-1
Projs. PO-6-0085, NR-092-525
Prepared in cooperation with Imperial Coll. of Science and Technology, London (England). Dept. of Chemical Engineering and Chemical Technology.

Descriptors: (*Aerosols, Statistical analysis), (*Condensation, Aerosols), (*Evaporation, Aerosols), Theory, Mathematical models, Thermodynamics, Nucleation, Molecular association, Gases, Vapors, Molecular properties, Great Britain.

The theory described represents a first attempt at devising a model of growth and decay of particles in aerosols which does not depend on the application of properties of the macroscopic condensate to clusters containing only a few molecules. Attention is confined to chemically inert binary mixtures in which one component is a monatomic vapour and the other is a monatomic permanent gas. The principal causes of growth and decay are unimolecular and bimolecular processes described by a canonical ensemble statistics developed from the theory of homogeneous gas reactions. The cohesive force between condensing molecules is pairwise additive, isotropic and of short range, and only the energy exchanged between translations and intermolecular vibrations affects the stability of clusters. Evolution of the aerosol from a specified initial distribution of clusters is described by an expanding chain of simultaneous non-linear rate equations in the concentrations and the time, with coefficients given by the statistics as explicit functions of temperature. These equations are not integrable, but may be solved by computer methods. Equilibrium distributions are obtained by detailed balancing, and show minima defining a cluster size at which isothermal growth is throttled. There is therefore a resemblance to the critical size effect in Volmer's theory. (Author)

ANL-7072 **Field 7D**
CFSTI Prices: HC$3.00 MF$0.75
Argonne National Lab., Ill.
ELECTRODE KINETICS.
by John P. Elder. Jul 65, 68p
Contract W-31-109-eng-38

Descriptors: (*Kinetic theory, Electrodes), (*Electrodes, Kinetic theory).

For abstract, see N 20 15.

NBL-233 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
New Brunswick Lab. (AEC), N. J.
BIAS DETERMINATION OF MASS SPECTROMETRIC ISOTOPIC ANALYSIS OF BORON USING PREPARED STANDARDS AND SODIUM AND CESIUM TETRABORATE CHARGE MATERIAL.
by W. F. King, and J. J. Pucilowski Jr. May 66, 8p

Descriptors: (*Boron, Mass spectroscopy), (*Mass spectroscopy, Boron).

For abstract, see N 20 15.

N66-14600 **Field 7D**
CFSTI Prices: HC$2.00 MF$0.50
American Univ., Washington, D. C.
INVESTIGATION OF ELECTROCHEMISTRY OF HIGH ENERGY COMPOUNDS IN ORGANIC ELECTROLYTES, MAY 1-OCTOBER 31, 1965.
by R. T. Foley, L. E. Helgen, and L. Schubert. 1965, 41p
Contract NGR-09-003-005
NASA-CR-62023

Descriptors: *Cyclic hydrocarbon, *Ester, *Chemical property, *Electrochemistry, *Electrolyte, *Organic compound.

N66-14895 **Field 7D**
CFSTI Prices: HC$3.00 MF$0.75
Liege Univ. (Belgium).
STUDIES ON MOLTEN SALTS.
1965, 83p
Contract EURATOM-003-61-2
EUR-2466.E
Prepared for presentation at Discussions on Molten Salt Symposium 16-17 Sep. 64. Research sponsored in part by Euratom.

Descriptors: *Electrochemistry, *Molten-salt electrolyte, *Conference, *Diffusion coefficient, *Ion mobility, *Ionic reaction, *Transport property.

N66-15010 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
Adelaide Univ. (Australia). Dept. of Physics.
PARTIAL PHOTOIONIZATION CROSS SECTIONS FOR MOLECULAR OXYGEN.
by A. J. Blake, and J. H. Carver. Oct 65, 11p

Descriptors: *Oxygen, *Ionization cross section, *Molecular gas, *Photoionization.

N66-15792 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
DEPENDENCE OF SURFACE CONDUCTIVITY OF SODIUM CHLORIDE ON THE CHEMICAL NATURE OF THE SURFACE.
by J. P. Jayne, and C. E. May. Feb 66, 20p
NASA-TN-D-3236

Descriptors: *Conductivity, *Sodium chloride, *Surface property.

N66-16190 **Field 7D**
CFSTI Prices: HC$6.00 MF$1.50
Radiation Applications, Inc., Long Island City, N. Y.
FABRICATION AND TEST OF BATTERY SEPARATOR MATERIALS RESISTANT TO THERMAL STERILIZATION.
Final rept.
by P. A. Scardaville, and T. J. Wetherell. Dec 65, 298p
Contract NAS7-100
NASA-CR-69884

Descriptors: *Heat resistance, *Polyethylene, *Storage battery, *Separator, *Silver-zinc battery.

N66-18102 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
Cekmece Nuclear Research Center, Istanbul (Turkey).
CRYSTAL SPECTROMETER MEASUREMENT OF CEKMECE TR-1 THERMAL NEUTRON SPECTRUM.
by O. Akyuz, F. Bayvas, C. Cansoy, and F. Domanic. Nov 64, 18p CNAEM-19

Descriptors: *Spectrometer, *Thermal neutron, *Neutron spectrum.

N66-18149 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
Cekmece Nuclear Research Center, Istanbul (Turkey).
A SPECTROPHOTOMETRIC STUDY OF THE REDUCTION KINETICS OF URANIUM (VI) TO URANIUM (IV) BY MEANS OF HYDROXYMETHANESULPHINIC ACID (RONGALIT).
by E. Ozbora, and M. Talat-Erben. Feb 65, 23p
CNAEM-23

Descriptors: *Kinetics, *Uranium, *Reduction, *Spectrophotometry.

PB-170 764 **Field 7D, 20M**
CFSTI Prices: HC$6.00 MF$0.75
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
THE THERMODYNAMIC PROPERTIES OF PARAHYDROGEN FROM 1 TO 22K.
by J. C. Mullins, W. T. Ziegler, and S. Kirk. 1 Nov 61, 74p Technical rept. TR-1
Contract NBS-CST-7339
Proj. A-593

Descriptors: (*Thermodynamics, Hydrogen), (*Hydrogen, Thermodynamics), Equations of state.

The thermodynamic properties of parahydrogen have been calculated at one degree intervals from 1 to 22K using existing thermal and equation of state data. The properties calculated include the vapor pressure, heats of vaporization and sublimation, enthalpy and entropy. The enthalpy and entropy of solid parahydrogen at 0K were taken to be zero. The enthalpy and entropy of the vapor have been computed from the saturation pressure to 10 (-6) mm Hg. The tabulated results were used to construct a temperature-entropy diagram with lines of constant pressure, constant volume, constant enthalpy and constant quality over the temperature range 4 to 22K. In the selection of the experimental data used, heavy reliance has been placed on the work of Woolley, Scott and Brickwedde and Hoge and Arnold of the National Bureau of Standards. A more critical analysis of all existing data might result in slight changes in the

computed results. These slight changes are unlikely to affect the use of the computed results for engineering calculations. (Author)

AD-468 940 See Field 7C

AD-635 653 See Field 20L

AD-635 830 See Field 20J

AD-635 933 See Field 19D

AD-636 105 See Field 20M

AD-636 162 See Field 14B

AD-636 182 See Field 20I

AD-636 183 See Field 4A

PB-170 795 See Field 5B

7E. RADIO AND RADIATION CHEMISTRY

AD-635 890 **Field 7E**
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md., Applied Physics Lab.
CALCULATION OF A LASER MONOPULSE DURING INSTANTANEOUS SWITCH-IN OF AN INTERFEROMETER.
by A. M. Samson, and V. A. Savva. 17 Jun 66, 12p TG-230-T473
Contract NOw-62-0604-c
TT-66-61809
Trans. of Akademiya Navuk BSSR, Minsk. Doklady, v9 n1 p22-6 1965.

Descriptors: (*Lasers, Electromagnetic pulses), Interferometers, Atomic energy levels, Pumping (Optical), Mirrors, Equations, Numerical analysis, USSR.

Formulas are derived for analyzing the basic characteristics of a single-pulse Q-switching laser as functions of population inversion, pumping power, mirror reflectivity, and other properties of the active medium and resonator. Calculations based on these formulas show good agreement with computations made on a digital computer in two previous works by the authors. The limits of applicability of the formulas are discussed. (Author)

AD-636 034 **Field 7E, 20H, 4A**
CFSTI Prices: HC$2.00 MF$0.50
Avco Everett Research Lab., Everett, Mass.
NEUTRAL ATOM BREMSSTRAHLUNG.
Research rept.
by B. Kivel. Jun 66, 46p RR-247
Contract AF 29 (601)-7055
Proj. AF-5710

Descriptors: (*Bremsstrahlung, *Nuclear cross sections), (*Oxygen, Bremsstrahlung), (*Nitrogen, Bremsstrahlung), Electrons, Elastic scattering, Polarization, Atomic energy levels, Infrared radiation, Air.

Predictions are given for the Bremsstrahlung absorption cross section of atomic oxygen and atomic nitrogen. The electron-atom interaction potential energy is adjusted to give agreement with the photo-absorption measurements of the negative oxygen ion. The exchange force is treated in an approximate manner following a suggestion by Slater but adjusted to take account of the dependence on the configuration of the electron wave. The difference in the exchange force for s and p-waves as well as the difference between the triplet and quintet configurations in atomic nitrogen must be preserved to obtain predictions for the Bremsstrahlung which are in agreement with experiments. The atomic oxygen absorption cross section is about a factor 5 less than that of atomic nitrogen in agreement with the measurements of Taylor. The Maxwell average atomic nitrogen Bremsstrahlung absorption cross section is insensitive to temperature. The atomic nitrogen cross section deviates somewhat from the Kramers wavelength dependence becoming relatively larger in the blue. (Author)

AD-636 036 **Field 7E, 20H, 4A**
CFSTI Prices: HC$1.00 MF$0.50
Avco Everett Research Lab., Everett, Mass.
BREMSSTRAHLUNG IN AIR.
Research rept.
by B. Kivel. Jun 66, 20p RR-249
Contract AF 29 (601)-7055
Proj. AF-5710

Descriptors: (*Bremsstrahlung, *Nuclear cross sections), (*Air, Bremsstrahlung), (*Nitrogen, Bremsstrahlung), (*Oxygen, Bremsstrahlung), Electrons, Elastic scattering, Emissivity, Intensity, Infrared radiation, Approximation (Mathematics).

The partial wave analysis for Bremsstrahlung and elastic scattering by molecular nitrogen is reviewed. These studies suggest that the Bremsstrahlung in the field of molecular nitrogen can be estimated from the measured momentum transfer cross section. Using this approximation for the molecular components and recent calculations of Bremsstrahlung in the field of atomic oxygen and nitrogen, the emissivity and intensity from neutral Bremsstrahlung in high temperature air is estimated. (Author)

N66-18109 **Field 7E**
CFSTI Prices: HC$1.00 MF$0.50
Cekmece Nuclear Research Center, Istanbul (Turkey).
INVERSION OF THE CYANIDE GROUP INTO ISO-CYANIDE UNDER GAMMA IRRADIATION.
by N. Seber, M. Talat-Erben, and E. Unseren. Sep 65, 15p CNAEM-28

Descriptors: *Inversion, *Nitrile, *Cyanide, *Gamma radiation.

For abstract, see T 66 17.

AD-635 583 See Field 18H

AD-635 655 See Field 18D

AD-635 692 See Field 18D

AD-635 836 See Field 7A

AI-CE-15 See Field 7C

CONF-651111 See Field 6O

K-1666 See Field 7B

PB-170 604 See Field 11L

PB-170 653 See Field 7B

PB-170 654 See Field 7C

8. EARTH SCIENCES AND OCEANOGRAPHY

PNE-481 See Field 6F

8A. BIOLOGICAL OCEANOGRAPHY

AD-636 119 **Field 8A, 6F, 6C**
CFSTI Prices: HC$2.00 MF$0.50
Texas A and M Univ., College Station. Dept. of Oceanography.
BIOFOULING STUDIES OFF PANAMA CITY, FLORIDA. I.
Technical rept., Jun 65-May 66.
by Willis E. Pequegnat. 12 Jul 66, 40p Ref-66-17T
Contract Nonr-2119 (04)
Proj. NR-083-036, T-A/M-286-1

Descriptors: (*Barnacles, Fouling), (*Marine biology, Mexico Gulf), (*Fouling, Marine biology), Underwater equipment, Floats, Halocarbon plastics, Antifouling coatings, Oceanographic data, Environmental tests.

This report presents partial results of a study of biofouling conducted offshore at Panama City, Florida. The data presented were derived from a fouling station established 25 miles offshore in a water depth of 46m. Two arrays of plastic floats were installed at this station, at depths of 4, 10, 17, 29, and 44m. One array was unprotected; the test floats of the other were protected with an organotin compound. Floats were photographed, harvested, and new ones installed at intervals of 1, 3, 6, 9 and 12 months. Data are presented on the nature of the accumulations on both arrays after field photographic, and laboratory analyses. Differences in the accumulations are accounted for through the influences of temperature, salinity, and organotin. The influences of distance from shore, depth, and season upon temperature and salinity are also evaluated. The results from this station will be compared with data derived from concomitant stations 11 miles and 2 miles offshore at Panama City. (Author)

AD-636 188 **Field 8A, 8J**
CFSTI Prices: HC$2.00 MF$0.50
Texas A and M Univ., College Station. Dept. of Oceanography.
NEARSHORE BIOLOGICAL AND HYDROGRAPHIC DATA FROM NEWPORT BEACH, CALIFORNIA.
Technical rept. May 64-Apr 65.
by W. E. Pequegnat. 8 Jul 66, 38p Ref-66-16T
Contract Nonr-2119 (05)
Proj. NR-104-814, A/M-412

Descriptors: (*Marine biology, Pacific Ocean), (*Hydrographic surveying, Pacific Ocean), Oceanographic data, Seacoast, California.

This report presents data collected within a coastal strip near Newport Beach, California that is delineated by bottom depths ranging from 4 to 60 meters. Hydrographic data emphasize those factors that influence the distribution and abundance of organisms. Biological data include some observations on plankton abundance, and on both infaunal and epifaunal. Initiation of growth-rate studies on epifaunal species are described. Hydrographic observations include seasonal temperature-depth structures, oscillations of isotherms, salinity ranges, seasonal and vertical distribution of dissolved oxygen, and preliminary values for dissolved and particulate organic carbon. Some data are presented on water movements, including normal currents, surface-wave induced movements over submarine reefs, and inshore temperature flucutations associated with internal waves. (Author)

PB-170 608 **Field 8A, 8J, 6F**
CFSTI Prices: HC$3.00 MF$0.75
Texas A and M Univ., College Station. Dept. of Oceanography.
BIOLOGICAL PRODUCTIVITY OF ANTARCTIC WATERS.
Data rept.
by Sayed Z. El-Sayed. Apr 66, 82p
Grant NSF-G-167
Proj. A/M-398

Descriptors: (*Antarctic regions, Marine biology), (*Marine biology, Ecology), Photosynthesis, Tables, Oceans, Physical properties, Chemical properties, Seas, Marine meteorology.

The purpose of the report is to present the physical, meteorological, chemical and biological data obtained during Cruise VIII aboard the ARA/ Capitan Canepa and Cruise IX aboard the Argentine ice-breaker General San MARTIN. The former cruise, which lasted from October 20 to De-

cember 17, 1964, covered the coast of Argentina and the Drake Passage. The latter cruise (November 10, 1964 - March 6, 1965) had a wider coverage. The areas invetigated during this cruise included: THE COAST OF Argentina, Drake Passage, Weddell Sea, Bransfield Strait, Gerlache Strait and the Bellingshausen Sea.

PB-170 722 **Field 8A**
CFSTI Prices: HC$3.00 MF$0.50
Biological Sciences Communications Project, George Washington Univ., Washington, D. C.
AQUATIC BIOLOGY SERIALS: A WORLD-WIDE LIST OF TITLES (BOTH CURRENT AND CEASED) WITH SELECTED DESCRIPTIVE INFORMATION.
by Mildred Benton, and Charles W. Shilling. Aug 63, 43p BSCP-11-63
Supported by NIH. NSF Scientific Documentation Project.

Descriptors: (*Marine biology, Periodicals), Symposia, Biology.

In the course of development of a Biological Serial Record Center, a decision was made to approach the task by specific subject areas. Due to the recent upsurge of interest within the scientific community in oceanography and its various aspects, it was felt that by selecting aquatic biology as the first area to be searched, a contribution might be made to the overall fund of knowledge on the subject. The list is representative of an effort to record and describe the serial publications of the world (periodicals, proceedings of societies, and symposia), related to some aspect of aquatic biology. Presentation is in two sections. Section I comprises those titles which have been examined and for which complete information is available. Section II comprises those titles on which work is in progress. Some have not been located in any Washington, D. C. library; some require further checking for identification; and some are in languages for which translators are not immediately available.

AD-635 656 **See Field 13J**

AD-635 864 **See Field 8J**

8B. CARTOGRAPHY

AD-476 106 **Field 8B**
CFSTI Prices: HC$6.00 MF$0.50
RAND Corp., Santa Monica, Calif.
GREAT CIRCLEDOM REVISITED; A SIMPLE, ACCURATE METHOD FOR DETERMINING GREAT CIRCLE DISTANCES AND ROUTES ON POLAR STEREOGRAPHIC PROJECTIONS.
by R. B. Murrow. Nov 65, 42p RM-4081-PR
Contract AF49 (638)-66-C-0001

Descriptors: (*Maps, Northern hemisphere), (*Northern hemisphere, Maps), (*Southern hemisphere, Maps), Distance-measuring equipment, Graphics, Earth (Planet), Navigation.

A discussion of polar stereographic projections. These maps are extensively used by operation planners, who have been following unnecessarily complex methods for determining great circle distances and routes on them. This Memorandum presents in detail a simple, accurate method for these determinations, a method well known to cartographers but apparently less familiar to planners. (Author)

AD-636 190 **Field 8B, 14E**
CFSTI Prices: HC$1.00 MF$0.50
Institute of Modern Languages, Inc., Washington, D. C.
ELECTRONICS APPLIED IN AERIAL SURVEYING.
by Wei-hsing Kuo. Jul 66, 9p
Contract DA-44-009-AMC-1563 (T)
Proj. DA-4A623501D-853
ESDLIT-1860-66, TT-66-61851
Trans. of Wu Hsien Tien (Chinese Peoble's Republic) n8 p1-2 1965.

Descriptors: (*Surveying, Aerial photography), China, Electronic equipment, Photographic equipment, Maps.

For abstract, see T 66 17.

AD-635 540 **See Field 8F**

AD-635 855 **See Field 14E**

8C. DYNAMIC OCEANOGRAPHY

AD-455 763 **Field 8C**
CFSTI Price: HC$3.00
Naval Civil Engineering Lab., Port Hueneme, Calif.
TSUNAMI DAMAGE AT KODIAK, ALASKA, AND CRESCENT CITY, CALIFORNIA, FROM ALASKAN EARTHQUAKE OF 27 MARCH 1964.
by W. J. Tudor. Nov 64, 94p Technical note N-622

Descriptors: (*Ocean waves, Alaska), (*Ocean waves, California), Earthquakes, Earthquake-resistant structures, Damage, Photographs, Maps, Energy, Aerial photographs, Harbors.

Identifiers: Tsunami.

A survey of water wave damage to waterfront facilities at Kodiak, Alaska, and Crescent City, California, made about one week after the 27 March 1964 Alaskan earthquake of about 8.3 Richter scale indicates light to moderate damage from four to ten feet inundation and heavy damage from impact by wave-driven ships and debris. The series of six seismic sea waves at Kodiak had crests ranging from 15 to 24 feet above MLLW and periods varying from 27 to 90 minutes. The largest wave at Crescent reached 21 feet above MLLW and had a period of 55 minutes. It is concluded that at Kodiak and Crescent City: Piers with moored ships had decking damaged; piers with adequate deck-pile connections did not have decking uplifted; lines to large buoys not designed for full submergence; fishing boats moored in harbor were damaged by breakaways, grounding, and sinking; single-story, light-frame structures did not survive well; multi-story buildings demonstrated good resistance; powerplants, communication lines, equipment and vehicles had functional failure when submerged. Reconstruction of all low-lying sections of cities and ports should consider defense against tsunami. (Author)

AD-472 792 **Field 8C, 14B**
CFSTI Prices: HC$6.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
THE DEVELOPMENT OF A WAVE HEIGHT MEASUREMENT SYSTEM TO PROVIDE AUTOMATIC RECORDING OF SEA-STATE OFFSHORE AT THE CARDIGAN BAY RANGE,
by T. C. Griffiths, K. T. Jackson, and G. Palmer. Jul 65, 27p Technical rept. TR-65139

Descriptors: (*Ocean waves, Height finding), Measurement, Instrumentation, Spar buoys, Stability, Errors, Telemeter systems, Very high frequency, Performance (Engineering), Design, Great Britain.

A requirement has arisen at R.A.E. Aberporth to measure sea-state at considerable distances offshore. To meet this requirement, it is necessary to define the surface profile of the sea at a given point to an accuracy of plus or minus 6 inches under maximum peak/peak wave conditions of 8 feet. A system has been developed based on a stable platform in the form of a spar-buoy insensitive to wave-motion; upon this is mounted a resistive type of electronic sensing unit to generate an electrical analogue of wave height, which is transmitted to a shore base by means of a telemetry link. This report describes the design features of stabilized spar buoys and the development of the electronic sensing unit etc.; it gives experimental data from tests and outlines the development of an engineered system for operational use. (Author)

AD-635 887 **Field 8C**
CFSTI Prices: HC$3.00 MF$0.75
Naval Missile Center, Point Mugu, Calif.
OCEAN WAVE PROFILE RECORDER. AN OCEANOGRAPHIC INSTRUMENT TRANSPORTABLE BY HELICOPTER.
Technical memo.
by E. B. Croson. 11 Jul 66, 63p TM-66-33
Tasks RMWC-53-056, RM-3501-002

Descriptors: (*Ocean waves, Recording systems), (*Oceanographic equipment, Portable), Helicopters, Design, Operation, Surface properties, Oceanographic data, Magnetic recording systems.

The report describes the development, the design, and the operation of the portable ocean wave profile recorder (OWPR). The appendix is intended to serve as an operations and maintenance manual until such time that the operating and maintenance procedures are published as a separate document. The OWPR, launchable and retrievable with a helicopter, provides the user with an accurate means of monitoring and measuring ocean surface conditions. The OWPR data, which are recorded on a self-contained magnetic tape recorder and transmitted by a self-contained telemetry transmitter, may be reproduced to show a line graph of the ocean surface conditions; or the data may undergo a comprehensive mathematical analysis to show various wave structure characteristics. The OWPR may operate in any ocean, the only requirements being that the place chosen must be accessible by helicopter and that the water depth must be 150 feet or more. (Author)

AD-635 946 **Field 8C**
CFSTI Price: MF$0.50
Naval Oceanographic Office, Washington, D. C.
OCEAN CURRENTS IN THE VICINITY OF THE JAPANESE ISLANDS AND CHINA COAST.
Second ed.
1964, 15p Pub-237

Descriptors: (*Ocean currents, *Yellow Sea), (*East China Sea, Ocean currents), Wind, Tides, Oceanographic data, Maps, Japan Sea.

This publication presents surface current and wind data from all available sources. Prevailing currents, resultant set of tidal and wind driven currents, and mean current speed in knots are given. The flow path of the strong and stable Kuroshio is indicated as are the general locations of lesser currents. Wind roses are presented by 5 degrees quadrangles. (Author)

AD-636 218 **Field 8C, 20D**
CFSTI Prices: HC$1.00 MF$0.50
Naval Oceanographic Office, Washington, D. C.
CHANGES IN THE COMPONENTS OF WAVES WHEN REACHING SHALLOW WATER.
by I. S. Brovikov. 1966, 10p Trans-235
TT-66-61853
Izmenenie Elementov Voln Ikh Vykhode Na Melkovode, trans. of Gosudarstvennyi Okeanograficheskii Institut. Trudy (USSR) v50 p27-32 1960.

Descriptors: (*Water waves, *Tidewater), Hydrodynamics, Seacoast, Beaches, USSR.

The study discusses changes in wave components as they reach shallow water. The friction of water particles against bottom and the irreversible process of the disintegration of waves resulting from the deformation of their shape are considered as the main factors that affect the changes in the components of waves as they reach shallow water. Two cases are discussed: (1) T=const. and (2) h/lambda=const. The chosen equation of the profile

of the coastal slope is x=a H to the nth power. (Author)

AD-636 225 **Field 8C, 20D**
CFSTI Prices: HC$4.00 MF$0.75
Scripps Institution of Oceanography, La Jolla, Calif.
THEORETICAL AND EXPERIMENTAL STUDY OF WAVE ENHANCEMENT AND RUNUP ON UNIFORMALY SLOPING IMPERMEABLE BEACHES.
Final rept.
by Wm. G. Van Dorn. 31 May 66, 110p SIO-66-11
Contract Nonr-2216 (16)

Descriptors: (*Beaches, *Water waves), Hydrodynamics, Theory, Experimental data, Nomographs.

The shoaling enhancement of small-amplitude, dispersive wave trains traveling over uniform, impermeable slopes was observed in a specially-constructed wave channel, where the reproducible wave elevation measurement accuracy was about .0005-in. These observations substantially support the enhancement predicted from linear theory (conservation of energy flux) except in very shallow water and on very steep slopes, where accelerative effects become important. On the hypothesis that small-amplitude runup theory might be similarly valid for periodic waves of finite height, provided that the positive incident wave amplitude is replaced by the local crest height above still water, this theory was modified to include the effect of the superelevation under a wave crest due to profile asymmetry. The modified theory is shown to agree acceptably with runup observations of larger waves previously reported-both for breaking and non-breaking waves. Because solutions to the modified theory cannot conveniently be obtained by manual calculation, a nomograph chart is included, from which runup predictions can be easily made, given only the wave height, period, and water depth a wave-length or so from shore, and the beach slope. Use of this nomograph for non-uniform slopes, oblique incidence, and non-periodic waves is also discussed. (Author)

PB-170 629 **Field 8C, 4B**
CFSTI Prices: HC$1.50 MF$0.50
Travelers Research Center, Inc., Hartford, Conn.
BACKGROUND STUDIES FOR THE DEVELOPMENT OF NUMERICAL MODELS OF THE ATMOSPHERE -OCEAN PLANETARY BOUNDARY LAYER.
Final rept.
by Joseph P. Pandolfo, and Philip S. Brown, Jr.
Feb 66, 33p Rept. no. 7041-203
Contract Cwb-11015

Descriptors: (*Micrometeorology, Marine meteorology), (*Marine meteorology, Micrometeorology), Atmosphere, Oceans, Boundary layer, Mathematical models, Energy, Transport properties.

Investigations prior to the development of numerical models for studying vertical transfer processes in the air-sea planetary boundary are described. In the first investigation, time-dependent solutions are obtained for a linear model comprising two layers of constant viscosity, density, and geostrophic flow separated by a horizontal interface at which these properties differe discontinuously. The second section outlines the modeling formulas and solution procedures used in the first version of a computer program for a non-linear numerical model. The third section presents the results of some radiative computations carried out for hypothetical soundings in the atmospheric boundary layer. These results are to be compared with observational results obtained by the Sea-Air Interaction Laboratory of ESSA. The comparisons will provide some guidance as to the possibility of including radiative transfer processes and interface heat-balance computations in future versions of the models; they may also be of use in indicating possible improvements in airborne radiative thermometry for the measurement of sea-surface temperatures.

PB-170 476 **See Field 8J**

8D. GEOCHEMISTRY

PB-170 540 **Field 8D, 7B**
CFSTI Prices: HC$4.00 MF$0.75
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
APPLICATION DE LA CHROMATOGRAPHIE SUR PAPIER A LA DETERMINATION DE CERTAINS ELEMENTS DANS LES MINERAUX LES ROCHES (Application of Paper Chromatography to the Determination of Some Elements in Minerals and Rocks).
Doctoral thesis in French.
by Henri Agrinier. 1966, 98p CEA-R-2791
Text in French; Attached Summary in English.

Descriptors: (*Minerals, Chromatographic analysis), (*Rock (Geology), Chromatographic analysis), (*Chromatographic analysis, Geochemistry), Soils, Ores (Metal sources), Niobium, Tantalum, Titanium, Cobalt, Copper, Manganese, Tin, Germanium, Arsenic, Antimony, Bismuth, Uranium, Thorium, Beryllium, Gold, Lead, Zinc, Vanadium, Molybdenum, France.

The publication describes work in applying paper chromatography to the fields of mineralogy and geology. The separation and determination of the following elements were studied: Nb, Ta, Ti, Co, Cu, Mn, Sn, Ge, As, Sb, Bi, U, Th, Be, Au, Pb, Zn, V and Mo. The development of separation methods for these various elements led to the solution of many interference problems. These methods make it possible to separate and measure mineral components. They also permit one to search for trace elements in ores, rocks soils and carbonaceous materials. It is pointed out that this technique may equally be used for analysis in very radioactive environments. (Author)

8E. GEODESY

AD-444 997 **Field 8E**
CFSTI Price: HC$3.00
Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
1963 TECHNICAL PAPERS: GEODETIC WORKING GROUP.
Jul 64, 70p IRIG-105-64

Descriptors: (*Geodetics, Scientific research), Gravity, Photogrammetry, Lasers, Satellites (Artificial), Flares, Instrumentation, Ballistic cameras, Hydrophones, Position finding, Guided missile ranges, Seas, Anomalies.

Contents: Geodetic research in the Space Age; Geodetic Problems Encountered in Testing Missiles, Satellites and Space Vehicles; Geodetic Stellar Camera Systems, Global Gravity, Ship Location and Hydrophone Systems, High Order Ground Surveys on the AMR, and Lunar and Space Geodetic Applications; Summary of Progress in Gravity Activities in the US; and WSMR BC-4 Ballistic Instrumentation system. (Author)

AD-635 573 **Field 8E**
CFSTI Prices: HC$3.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
A STATISTICAL ESTIMATE OF THE ACCURACY OF AVERAGING THE DISTURBED VALUE OF THE GRAVITATIONAL ACCELERATION FOR A FINITE PERIOD OF TIME.
by Yu. A. Tarakanov. 1966, 22p ACIC-TC-1066 TT-66-61776
Statisticheskaya Otsenka Tochnosti Osredneniya Vozmushchennogo Znacheniya Sily Tyazhesti na Konechnom Otrezke Vremeni, trans. of Prikladnaya Geofizika (USSR) n37 p135-46 1963.

Descriptors: (*Gravity, Measurement), Statistical analysis, Acceleration, USSR.

For abstract, see T 66 17.

AD-635 800 **Field 8E**
CFSTI Prices: HC$1.00 MF$0.50
Alaska Univ., College. Geophysical Inst.
GRAVITY MEASUREMENTS IN THE KATMAI VOLCANO AREA, ALASKA.
Scientific rept.
by Eduard Berg, and Jurgen Kienle. Apr 66, 17p UAG-R-176
Grants AF-AFOSR-701-64, NSF-GP-4360

Descriptors: (*Gravity, *Alaska), Measurement, Volcanoes, Drift.

The gravity values of 80 stations along five profiles are given and the free air and Bouguer anomalies for 6 different densities from 2.20 g/cu cm to 2.85 g/cu cm are presented. The profiles cover a region which has not been investigated before. (Author)

AD-635 923 **Field 8E**
CFSTI Prices: HC$1.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
STUDIES OF THE EARTH'S FIGURE WITHOUT USE OF THE NORMAL FIELD.
by I. F. Monin. Jul 66, 14p ACIC-TC-1078 TT-66-61813
Ob Izuchenii Figury Zemli bez Ispolzovaniya Normalnogo Polya, trans. of Sbornik Statei po Geodezii (USSR) v11 p63-71 1960.

Descriptors: (*Geodesics, Geometric forms), Earth, Ellipsoids, Gravity, Mathematical analysis, USSR.

A simpler solution is presented of the Stokes problem without the use of the normal field. Adequate formulas for the deflection of the plumb line are also given.

AD-635 924 **Field 8E**
CFSTI Prices: HC$1.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
DETERMINATION OF THE FIGURE OF THE EARTH WITHOUT THE USE OF THE CONCEPT OF A NORMAL COMPARISON PLANET.
by S. V. Gromov. 1966, 15p ACIC-TC-1077 TT-66-61814
Opredelenie Figury Zemli Bez Privlecheniya Ponyatiya o Normalnoi Planete Sravneniya, trans. of Leningrad Univ. Vestnik (USSR) v20 n19 Seriya Matematiki, Mekhaniki i Astronomii n4 p145-52 1957.

Descriptors: (*Earth (Planet), Configuration), (*Geodesics, Earth (Planet)), Surface area, USSR.

In investigating the figure of the Earth by gravimetrical methods use is made generally of a normal comparison planet, and as such a level spheroid is mostly used. Adopting the method of Sludsky and making no use of a normal Earth, formulae are developed, which permit to computate the components of the inclination of the vertical in points of the physical surface of the Earth as well as the altitudes of some quasigeoid relatively to a nonlevel ellipsoid. (Author)

8F. GEOGRAPHY

AD-635 540 **Field 8F, 8B**
CFSTI Prices: HC$4.00 MF$0.50
Department of the Army, Washington, D. C.
THE APPLICATION OF CARTOGRAPHIC METHODS IN STUDYING NEW TECTONIC MOVEMENTS.
by A. M. Berlyant, and L. F. Litvin. 30 Nov 65, 8p I-8559-B
TT-66-61774

Primenenie Kartograficheskogo Metoda dlya Izucheniya Noveishikh Tektonicheskikh Dvizhenii, trans. of Moscow Univ. Vestnik (USSR) v19 n3 1964.

Descriptors: (*Mapping, *Structural geology), Maps, Terrain, Geophysics, USSR.

Identifiers: Tectonics.

A morphometric method of tectonic structural prospecting was proposed as a laboratory method of ascertaining the tectonic structure of a territory by studying the relief on large-scale topographic maps.

AD-635 775 **Field 8F, 5C, 13B**
CFSTI Prices: HC$6.00 MF$1.00
Rhode Island Univ., Kingston.
NARRAGANSETT BAY: A MARINE USE PROFILE.
Final rept.
by Lewis M. Alexander. Jun 66, 131p
Contract Nonr-396 (09)
Proj. NR-389 134

Descriptors: (*Narragansett Bay, *Economics), (*Marine geology, Narragansett Bay), Estuaries, Industries, Natural resources, Seafood, Commerce, Population, Recreation, Tropical cyclones, Oceanology, Economic geology.

To the people who live in the Narragansett Bay area, the Bay is important for various forms of marine resource use, such as recreation, shellfishing, commercial navigation, for naval installations, and as a disposal area for sewage and industrial wastes. Some of these uses are in direct conflict with one another, as between sewage disposal and sellfishing or shoreline use for industry and for private residences. In order to examine the salient factors in land/sea interaction in the Bay area, a marine use profile has been worked out, involving such elements as marine resource availability, existing demand for these resources, and present forms of marine resource use. From these, the nature and extent of marine orientation in this particular coastland can be analyzed. It is postulated that marine use profiles may be meaningful for studying other coastal areas of the world, particularly in terms of marine orientation - a concept which may in time come to have political and legal connotations with respect to control of marine resources beyond a country's territorial waters. (Author)

PB-169 922 **Field 8F**
CFSTI Prices: HC$3.00 MF$0.75
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia). Soil Mechanics Section.
TERRAIN FEATURES OF THE MT ISA-DAJARRA REGION AND AN ASSESSMENT OF THEIR SIGNIFICANCE IN RELATION TO POTENTIAL ENGINEERING LAND USE.
Soil mechanics technical paper.
by K. Grant. 26 Jul 64, 127p TP-1

Descriptors: (*Terrain, Australia), (*Australia, Terrain), Geology, Economic geology, Engineering, Climatology, Engineering geology, Soils, Plants (Botany).

Identifiers: Land.

The region has been described in terms of its climate, geology, geomorphology, soils, and vegetation. Engineering aspects of these topics have been considered. Based upon aerial photograph interpretation, the complex land systems of the region delineated by Christian et al. (Survey of the Barkly region, Northern Territory and Queensland, 1947-48. CSIRO Aust. Land Res. Ser. No. 3) have been divided into simple land systems. Each simple land system represents the area covered by a distinctive pattern on aerial photographs. The component units of each simple land system have been recognized in the field and described, and an assessment (mostly qualitative) has been made of the engineering characteristics of each complex land system, each simple land system, and each land unit. It would appear that simple land systems are valid entities for the assessment of engineering land use; complex and compound land systems contain terrain features too diverse for engineering interpretation although they may retain usefulness for grouping purposes. It would appear that there are too many simple land units to be adequately handled, but complex land units which describe only one terrain feature are sufficiently elementary for valid interpretation for engineering purposes. (Author)

PB-169 734 **See Field 13B**

PB-169 735 **See Field 13B**

PB-170 297 **See Field 5C**

PB-170 512 **See Field 5C**

PB-170 771 **See Field 5K**

PB-170 772 **See Field 5K**

PB-170 773 **See Field 5K**

PB-170 774 **See Field 5K**

PB-170 775 **See Field 5K**

PB-170 776 **See Field 5K**

PB-170 777 **See Field 5K**

PB-170 778 **See Field 5K**

PB-170 779 **See Field 5K**

PB-170 780 **See Field 5K**

PB-170 781 **See Field 5K**

PB-170 782 **See Field 5K**

PB-170 783 **See Field 5K**

PB-170 784 **See Field 5K**

PB-170 785 **See Field 5K**

PB-170 786 **See Field 5K**

PB-170 787 **See Field 5K**

8G. GEOLOGY AND MINEROLOGY

AD-635 541 **Field 8G, 8H**
CFSTI Prices: HC$1.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
SUBSURFACE ENVIRONMENT OF THE NEW JERSEY COASTAL PLAIN OF EASTERN MONMOUTH COUNTY.
Technical rept.
by John W. Walker. May 66, 26p ECOM-2708
Proj. DA-1P0-14501-B11A
Task 1P0-14501-B11A-01

Descriptors: (*Marine geology, New Jersey), Geological survey, Geophysics, Hydrology, Stratigraphy.

The geophysical background and geology of eastern Monmouth County, New Jersey are reviewed with emphasis on the area surrounding the U. S. Army Electronics Command, Fort Monmouth, New Jersey. The salient geophysical data is summarized in addition to the general subsurface environment including the descriptive stratigraphy and hydrology of the area. The report is prepared as an aid to investigators engaged in various facets of geoscientific research requiring an acquaintance with the local subsurface environment. The relationship of the physical environment to the geoscientific project is discussed and the need for specific geophysical test sites is emphasized. (Author)

AD-635 925 **Field 8G**
CFSTI Prices: HC$2.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
SOME GEOLOGICAL PROBLEMS OF THE PALEOZOIC EPOCH OF THE TARIM PLATFORM.
by Hu Ping, Wang Ching-pin, Kao Chen-chia, and Fang Hsiao-t'i. Jul 66, 34p ACIC-TC-1028
TT-66-61815
T'a Li Mu Ti T'ai Ku Sheng Tai Ti Chi Ko Chi Wer T'i, trans. of Ti Chih Hsueh Pao (Chinese People's Republic) v45 n2 p131-41 1965.

Descriptors: (*Geology, China), Structural geology, Stratigraphy, Paleontology, Geography.

Identifiers: Tarim Platform, Paleozoic.

For abstract, see T 66 17.

AD-636 174 **Field 8G**
CFSTI Prices: HC$2.60 MF$0.50
RAND Corp., Santa Monica, Calif.
ANALYSIS OF THE FORMATION OF METEOR CRATER, ARIZONA: A PRELIMINARY REPORT.
by R. L. Bjork. 6 Jul 61, 27p P-2370
Prepared for publication in Journal of Geophysical Research.

Descriptors: (*Meteorites, *Cratering), Petrology, Extraterrestrial topography, Impact shock, Shock (Mechanics), Arizona, Geology.

A theoretical study is made of the cratering process accompanying the impact of a 12,000 ton iron projectile on a semi-infinite half space of soft rock at a velocity of 30 km/sec. The constituents and velocity approximate those involved in the formation of Meteor Crater, Arizona. The assumption is made that the process is hydrodynamic in nature, since the pressures generated so far exceed the strengths of the materials. At these high pressures, the compressibilities of the materials must be taken into account with the result that shocks are generated. The motion is solved by numerical means, and graphs showing details of the motion are presented. The conclusion in this preliminary report is that the meteorite had a mass of between 30,000 and 194,000 tons, the range being due to the uncertainty in the impact velocity. (Author)

PB-169 582 **Field 8G, 13K**
CFSTI Prices: HC$1.60 MF$0.50
Brown and Root, Inc., Houston, Tex.
RISER CASING STRESS ANALYSIS. NESCO PRODUCTION COMPUTER STUDIES, SUBCONTRACT 65-83.
1965, 17p
Rept. on Proj. MOHOLE. Subcontracted to National Engineering Science Co., Houston, Tex. Supported in part by NSF.

Descriptors: (*Well logging, Feasibility studies), (*Pipes, Drilling), (*Drilling, Pipes), Floats, Stresses, Statics, Dynamics, Drills, Loading (Mechanics).

Identifiers: MOHOLE Project, Risers, Casing.

CONTENTS: (I) Static Analysis: (a) Determination of theta (infinity) at top of riser for various drill string lengths, platform excursions, and velocities. (b) Stress at bottom of riser vs. sea bed tension. (II) Dynamic analysis: (a) Loads at top of riser. (b) Loads at bottom of riser. (Author)

PB-169 583 **Field 8G, 13K**
CFSTI Prices: HC$3.60 MF$0.50
Brown and Root, Inc., Houston, Tex.
PROJECT MOHOLE PROGRESS REPORT FOR 19 OCTOBER 1965.

19 Oct 65, 33p
Subcontracted to National Engineering Science Co., Houston, Tex. Supported in part by NSF.

Descriptors: (*Well logging, Feasibility studies), (*Pipes, Drilling), (*Drilling, Pipes), Oceanographic equipment, Drills, Joints, Floats, Hydrodynamics, Stresses.

Identifiers: MOHOLE Project, Risers.

A study of the effects of a realistically flexible guide shoe has indicated that the effects on the riser are essentially equivalent to the effects of an ideal rigid guide shoe. This conclusion is found for a guide shoe with a simple support at the tip and for a fixed support 30 ft down or for a simple or fixed support 48 ft down. In lower riser design, it has been found that sea bed pretension over the range of 20,000-200,000 lb has slight effect upon the toal stress at the sea bed. The possibility of unfavorable landing base angles recommends against pretension at the high end of outside of that range. Realistic levels of friction in the cable system of an external harness slip joint are slightly beneficial insofar as stresses at the platform are concerned. Larger values of friction would also benefit the platform stresses but would start to deleteriously affect the curvatures in the neighborhood of the slip joint. The problem of interaction between a guide shoe and an external harness slip joint has been solved. Idealized studies of drill string curvatures within the slip joint have indicated that the internal diameter changes associated with an open slip joint do not create serious problems. The results of some studies of optimum greyhound, and of drilling without a riser, are enclosed. (Author)

PB-169 584 **Field 8G, 13K**
CFSTI Prices: HC$5.60 MF$0.50
Brown and Root, Inc., Houston, Tex.
PROJECT MOHOLE PROGRESS REPORT FOR SEPTEMBER 13, 1965.
1965, 53p
Subcontracted to National Engineering Science Co., Houston, Tex. Supported in part by NSF.

Descriptors: (*Well logging, Feasibility studies), (*Pipes, Drilling), (*Drilling, Pipes), Oceanographic equipment, Drilling machines, Stresses, Hydrodynamics, Drills, Flexural strength.

Identifiers: MOHOLE Project, Risers.

Studies completed on riser torsion have shown that negligible torque is introduced to the riser by out-of-plane bending, and that the drill-string torque has negligible effects upon bending at the riser-drill string combination. The work on angle time-history has been extended by making an approximate solution of a nonuniform riser. Approximate consideration of a large concentrated mass located at the variable displacement buoy location has shown somewhat more dynamic effects than result from the more idealized problem, but not sufficient effects to warrant consideration of the detailed time-history. Further investigation of the effects of the length of a variable curvature guide shoe has indicated that, because of the low probability of occurrence of total loads equivalent to an angle of 6 degrees, a 52-ft-long guide shoe is probably acceptable. A study of the stresses induced in the riser in the vicinity of the seabed, using most recent buoy, mud, and current data, has indicated that in an 11-in. - 14-in. riser, under the worst conditons, riser stresses of 46,000 lb would be induced. A cable-harness slip joint has been studied, with favorable results in that the calculated riser stresses for the external torsion system are lower than the stresses that are found for the internal system. (Author)

PB-169 585 **Field 8G, 13K**
CFSTI Prices: HC$2.00 MF$0.50
Brown and Root, Inc., Houston, Tex.
DYNAMIC STRESS ANALYSIS OF DRILL PIPE FOR LONGITUDINAL MOTION.
1965, 48p
Subcontracted to National Engineering Science Co., Houston, Tex. Rept. on Proj. MOHOLE. Supported in part by NSF.

Descriptors: (*Well logging, Feasibility studies), (*Pipes, Drilling), (*Drilling, Pipes), Drills, Stresses, Motion, Damping, Vibration, Fluid mechanics, Mathematical analysis.

Identifiers: MOHOLE Project, Drill pipes, Risers.

The results demonstrate the effects of parameters usually omitted in the longitudinal motion analysis of systems similar to the drill string problem. The effects due to changes in sizes of pipe in a tapered string, damping properties due to fluid circulation, and the different damping properties due to lighter and heavier fluids were studied with respect to drill pipe stresses and displacement at the bumper sub. The study was made by using a harmonic forcing function at the top of the drill string to represent the heaving motion of the drilling platform. The frequencies were varied for each system about the fundamental natural frequency so that not only the maximum response at the peak could be noted, but also the reduction of the amplification at frequencies away from the fundamental frequency. The true platform motion is not precisely harmonic in nature since the platform is subjected to the random sea forces. The harmonic natural frequency responses of the drill string represent maximum effects that could occur if the true damping is identical to the idealized damping, and the assumptions upon which the analysis is based are valid. (Author)

PB-169 587 **Field 8G, 13K**
CFSTI Prices: HC$1.60 MF$0.50
Brown and Root, Inc., Houston, Tex.
PROJECT MOHOLE SEPTEMBER PROGRESS REPORT.
28 Oct 65, 17p
Subcontracted to Battelle Memorial Inst., Columbus, Ohio. Supported in part by NSF.

Descriptors: (*Well logging, Feasibility studies), (*Pipes, Drilling), (*Drilling, Pipes), (*Fatigue (Mechanics), Pipes), Steel, Corrosion, Plating, Zinc, Corrosion inhibition, Stress corrosion.

Identifiers: MOHOLE project, Drill pipes.

Examination was made of the fatigue crack propagation behavior of more massive specimens than employed previously. The objective is to learn how AMS 6427 steel responds to the presence of a small flaw insofar as the fatigue initiation process is concerned and then to the propagation of that fatigue crack as additional stress cycles are applied. Information will thus be gained that will be useful in delineating the behavior of the drill pipe in the event a fatigue crack forms. Two important facts emerge from the corrosion fatigue tests conducted: (1) Of all the corrosion fatigue control measures evaluated so far, the use of zinc plating has provided the only positive answer. (2) However, there still may be some assistance to be gained by using a proper inhibitor and from the use of a different mud. (Author)

PB-169 588 **Field 8G, 13K**
CFSTI Prices: HC$1.60 MF$0.50
Brown and Root, Inc., Houston, Tex.
PROJECT MOHOLE OCTOBER PROGRESS REPORT.
17 Nov 65, 13p
Subcontracted to Battelle Memorial Inst., Columbus, Ohio. Supported in part by NSF.

Descriptors: (*Well logging, Feasibility studies), (*Pipes, Drilling), (*Drilling, Pipes), (*Fatigue (Mechanics), Pipes), Corrosion, Zinc, Plating, Stress corrosion, Sea water.

In fatigue crack propagation studies, tests of the effect of mean stress on the surface-flawed flat specimens were continued. Results tend to support the tentative comment made in the September progress report, (PB-169 587), that the effect of mean stress in the range 25-75 ksi may not be too important with respect to crack propagation. New corrosion fatigue studies were initiated during this period. Fatigue tests were conducted in the new fresh water mud with an attempt to maintain the pH in the range of 10 to 10.5. The bare specimen tested at room temperature failed at 122,800 cycles, showing no improvement over the previous mud tests. The test conducted in seawater on a bare specimen coated with X-2462 inhibitor showed no improvement over the plain seawater tests. Failure occurred at 212,000 cycles. The 1/4-in.-holiday specimen tested at 200F in the new mud showed an unexpectedly long fatigue life. Failure occurred after nearly 392,000 cycles. This was longer than the fatigue life of the shorter-lived zinc-plated specimen tested some time ago in seawater at room temperature at the same stress level. Examination of this specimen after testing indicated that there may be a tendency for the zinc plating to peel off of the specimen surface. (Author)

PB-170 770 **Field 8G**
CFSTI Prices: HC$6.00 MF$0.50
California Univ., Berkeley.
RECENT REVIEW ARTICLES IN GEOLOGY.
by H. E. Hawkes. 6 Jun 66, 34p
Contract NSF-C310
Task 71
NSF Scientific Documentation Project. Report on a study of scientific publications in the geological sciences.

Descriptors: (*Geology, *Bibliographies), Reviews, Reports.

A list of review articles in the pages that follow is presented in part as an aid to geologists who are looking for specialized summaries, and in part as a sample of how much and what kind of review material is available in the current geological literature.

AD-636 047 **See Field 8K**

AD-636 092 **See Field 8J**

AD-636 184 **See Field 20I**

AD-636 219 **See Field 8J**

PB-169 581 **See Field 11K**

PB-169 739 **See Field 5C**

PB-170 524 **See Field 5C**

PNE-481 **See Field 6F**

8H. HYDROLOGY AND LIMNOLOGY

AD-635 739 **Field 8H**
CFSTI Price: MF$2.00
Army Engineer District, New Orleans, La.
MISSISSIPPI RIVER, BATON ROUGE TO GULF OF MEXICO; INVESTIGATIONS AND DATA COLLECTION FOR MODEL STUDY OF SOUTHWEST PASS MISSISSIPPI RIVER; PROTOTYPE INVESTIGATION, VOLUME I.
Apr 59, 453p

Descriptors: (*Deltas, Lousiana), (*Rivers, *Sedimentation), Hydrology, River currents, Breakwaters, Hydrographic surveying, Hydraulic models, Mississippi data, Tables, Maps.

Identifiers: Mississippi River.

This report, in two volumes, presents field data collected in South west Pass of the Mississippi River and vicinity from October 1956 to November 1957 plus pertinent prototype data available from previous investigations. The data were col-

lected to use in the model verification and in model and prototype investigation. Continuous observations were made of velocity and direction of flow at various stations in the pass and the Gulf of Mexico; wind velocity and direction at Burrwood, La.; wave height, direction, and period in the gulf; and water-surface elevations at various stations. Twenty-five-hour period comprehensive and continuous hourly recordings of velocities and directions of flow and salinity concentrations were made at selected locations at approximately every 4-ft increment of rising and falling stage at the Carrollton Gage (New Orleans, La.) on the River concurrent with a spring tide and a neap tide in the gulf. Semimonthly surveys of bed topography in the pass and in the gulf were made including procurement of bed-material samples. Pertinent hydrographic surveys of the outer bar and vicinity were made for various purposes during the progress of the program. (Author)

AD-635 740 **Field 8H**
CFSTI Price: MF$1.25
Army Engineer District, New Orleans, La.
MISSISSIPPI RIVER, BATON ROUGE TO GULF OF MEXICO; INVESTIGATIONS AND DATA COLLECTION FOR MODEL STUDY OF SOUTHWEST PASS MISSISSIPPI RIVER; PROTOTYPE INVESTIGATION, VOLUME II.
Apr 59, 107p

Descriptors: (*Deltas, Louisiana), (*Rivers, Sedimentation), Hydrology, River currents, Breakwaters, Hydrographic surveying, Hydraulic models, Data, Maps, Graphics.

Identifiers: Mississippi River.

For abstract, see T 66 17.

AD-635 932 **Field 8H, 20D**
CFSTI Prices: HC$1.00 MF$0.50
New York Univ., N. Y. Geophysical Sciences Lab.
STEADY STATE INTERACTIONS AMONG INTERSECTING TRAINS OF CAPILLARY-GRAVITY WAVES.
Technical rept.
by James B. Sullivan. Jun 66, 26p TR-66-7
Contract Nonr-285 (57)

Descriptors: (*Water waves, Transport properties), Energy, Two-dimensional flow, Perturbation analysis, Series.

Identifiers: Gravity waves.

Steady state solutions are obtained by a classical perturbation procedure for the problem of intersecting trains of capillary-gravity waves. Valid to second order in the wave slope, these solutions demonstrate the possiblity of wave interactions that do not exhibit an energy flux among the various wave components. (Author)

N66-18417 **Field 8H**
CFSTI Prices: HC$2.00 MF$0.50
Aktiebolaget Atomenergi, Stockholm (Sweden).
NEUTRON-ACTIVATION ANALYSIS OF NATURAL WATER APPLIED TO HYDROGEOLOGY.
by O. Landstrom, and C. G. Wenner. Dec 65, 33p AE-204

Descriptors: *Hydrography, *Water, *Neutron activation.

For abstract, see T 66 17.

AD-635 541 **See Field 8G**

8J. PHYSICAL OCEANOGRAPHY

AD-635 780 **Field 8J, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Navy Marine Engineering Lab., Annapolis, Md.
A PROPOSED SALINITY-TEMPERATURE CALIBRATION SYSTEM.
Research and development rept.
by P. B. Perry. Jul 66, 42p MEL-6/66

Descriptors: (*Oceanographic equipment, Test facilities), (*Sea water, Simulation), Salinity, Temperature, Test equipment, Instrumentation, Calibration, Control systems, Specifications.

A preliminary conceptual design is presented of a system which simulates the salinity and temperature characteristics of an ocean water environment for testing and evaluation of oceanographic instrumentation. The most notable feature of the system is a high degree of long-term temperature stability in a relatively large fluid volume. Detailed requirements for the system are developed, major machinery and control system components are suggested, a tentative system layout is presented, and modes of operation are delineated. Some of the major problems anticipated are discussed. Proposed procurement specifications for the complete system are appended. (Author)

AD-635 864 **Field 8J, 8A**
CFSTI Prices: HC$3.00 MF$0.75
Oregon State Univ., Corvallis. Dept. of Oceanography.
RESEARCH ACTIVITIES.
Progress rept. no. 17, 1 Oct 65-30 Mar 66.
by Susan Borden. Jun 66, 67p Ref-66-7
Contracts Nonr-1286 (10), Nonr-1286 (09)
Projs. NR-083-102, NR-083-600

Descriptors: (*Oceanology, Scientific research), Marine geology, Marine geophysics, Physical properties, Chemical properties, Radiochemistry, Ecology.

Contents: Physical oceanography, Geological oceanography, Geophysical oceanography, Chemical oceanography, Radiochemistry and radioecology, Biological oceanography.

AD-636 053 **Field 8J, 4B**
CFSTI Prices: HC$4.00 MF$0.75
Texas A and M Univ., College Station. Dept. of Oceanography.
AUTOMATED ENVIRONMENTAL DATA COLLECTED OFF PANAMA CITY, FLORIDA JANUARY 1965 - APRIL 1966.
Technical rept., Jan 65-Apr 66.
by A. Kirst Jr, and C. W. McMath Jr. Jun 66, 125p Ref-66-12T
Contract Nonr-2119 (04)
Projs. NR-083-036, A/M-286-D

Descriptors: (*Oceanographic data, Mexico Gulf), (*Meteorological parameters, Mexico Gulf), Automation, Oceanographic equipment, Meteorological instruments, Hydrographic surveying, Telemetering data, Seacoast, Florida.

This report is a summary of the environmental air-sea data collected in the nearshore region off Panama City, Florida by an automated data acquisition system. The data was collected between January 1965 and April 1966. Various phases of the data acquisition and reduction system are also discussed. (Author)

AD-636 092 **Field 8J, 8G**
CFSTI Prices: HC$4.00 MF$0.75
Texas A and M Univ., College Station. Dept. of Oceanography.
MICROPALEONTOLOGY AND MINERALOGY OF A TERTIARY SEDIMENT CORE FROM THE SIGSBEE KNOLLS, GULF OF MEXICO.
Technical rept.
by Thomas Edward Pyle. May 66, 115p Ref-66-13T
Contract Nonr-2119 (04), Grant NSF-GP-5187
Projs. NR-083-036, A/M-286A

Descriptors: (*Mexico Gulf, Ocean bottom sampling), (*Marine geology, Mexico Gulf), Sedimentation, Well logging, Stratigraphy, Paleontology, Petrology, Foraminifera, Plankton.

Identifiers: Tertiary.

The Sigsbee knolls are deep-sea hills which rise as much as 300 meters from the flat floor of the Sigsbee abyssal plain in the Gulf of Mexico. Although they are a favored coring site, only one core interpreted to contain pre-Pleistocene sediments has been obtained from their flanks. Studies of the calcareous nannoplankton and planktonic foraminifera in this core, number 64-A-9-5E, indicate that it contains sediments of Miocene, Pliocene, and Recent ages. The compressed nature of the stratigraphic section and the presence of authigenic minerals point to a very low sediment accumulation rate, roughly estimated to be about 1 mm per 1000 years. The low rate is interpreted to be due to accumulation on a topographic high which existed prior to the Middle Miocene. However, water content of five samples from the core averages 38% of wet weight and may be indicative of previous burial of these sediments at a depth of several tens of meters below the sediment-water interface. Two possible explanations of this apparent contradiction are discussed. Analysis of the depth ranges of the benthonic foraminifera suggests that the sediments were deposited in at least 1000 meters of water and provides further evidence of the invalidity of the hypothesis of Pleistocene-Recent downfaulting of the Gulf of Mexico. (Author)

AD-636 139 **Field 8J**
CFSTI Prices: HC$2.00 MF$0.50
Naval Oceanographic Office, Washington, D. C.
THE PROCESSES OF RECENT SEDIMENT FORMATION IN THE SOUTHERN AND CENTRAL PARTS OF THE INDIAN OCEAN.
by A. F. Lisitsyn. 1966, 26p Trans-225
TT-66-61845
Protsessy Sovreminnogo Osadkoobrazovaniya V Yuzhnoi I Tsentralnoi Chastyakh Indiiskogo Okeana, Trans. of mono. Sovremennye Osadki Morei I Okeanov, Moscow, 1961 p156-74.

Descriptors: (*Indian Ocean, *Sedimentation), Ocean bottom sampling, Marine geology.

The paper discusses the composition of sediments and rate of sedimentation in (1) the arid and (2) the tropical humid zones. Also the distribution of bottom sediments along meridional cross sections transecting the Indian Ocean are given. The meridional distribution of sediments is based on three cross sections: (1) from the Shackleton Ice Shelf to the Ganges, (2) from Antarctic Continent (Station 188) to the Bay of Aden, and (3) from the Antarctic Continent to the southern tip of Africa. The data are based on investigation conducted during the 4 cruises of the Antarctic expeditions organized by the Academy of Sciences of USSR from 1955 to 1959. Six diagrams and two tables present numerical and grafical data on the distribution of sediments and the relief of ocean floor. The influx and role of major Asian rivers in the formation of sediments in various parts on the Ocean is pointed out, giving also climatological data which affect the sedimentation process. (Author)

AD-636 219 **Field 8J, 8G**
CFSTI Prices: HC$1.00 MF$0.50
Naval Oceanographic Office, Washington, D. C.
THE CLASSIFICATION OF CONTEMPORARY MARINE SEDIMENTS.
by M. V. Klenova. 1966, 25p Trans-233
TT-66-61847
Klassifikatsiya Sovremennykh Morskikh Otozhenii, trans. of Okeanologiya (USSR) v3 n3 p527-37 1963.

Descriptors: (*Marine geology, Sedimentation), (*Sedimentation, Classification), Ocean bottom sampling, Stratigraphy, Petrology.

For abstract, see T 66 17.

PB-170 476 Field 8J, 8C, 4B
CFSTI Prices: HC$3.00 MF$0.75
Hawaii Inst. of Geophysics, Honolulu.
SEASONAL VARIATION OF HEAT EXCHANGE AND SURFACE TEMPERATURE IN THE NORTH PACIFIC OCEAN.
by Klaus Wyrtki. Feb 66, 71p HIG-66-3
Grant NSF-GP-5534

Descriptors: (*Pacific Ocean, Heat transfer), Periodic variations, Temperature, Surface properties, Oceanology, Evaporation, Graphics, Meteorological charts.

Climatic data from ship's weather reports during the period 1947 to 1960 have been used to calculate the heat exchange at the surface of the Pacific Ocean north of 20 S. The data were averaged over two-degree-squares and by months. Monthly maps of the heat used for evaporation, of the total heat exchange between sea and atmosphere, of sea surface temperature, and of the change of sea surface temperature from month to month have been drawn. For each ten-degree-square the seasonal variation of these components and of the incoming radiation is presented, as is the variability of the total heat exchange within each square. No analysis of the data is included in this report. (Author)

AD-635 660 See Field 20A

AD-635 668 See Field 17A

AD-636 168 See Field 20A

AD-636 188 See Field 8A

PB-170 603 See Field 8A

8K. SEISMOLOGY

AD-635 571 Field 8K, 17J
CFSTI Prices: HC$6.00 MF$0.50
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
VESIAC MONTHLY BULLETIN OF VELA UNIFORM RESEARCH PUBLICATIONS.
15 May 66, 26p VESIAC Bull-40

Descriptors: (*Seismology, Bibliographies), Periodicals, Seismic waves, Propagation, Geophysical prospecting, Heat transfer, Earthquakes, Nuclear explosions, Data processing systems.

Identifiers: Vesiac, Vela-Uniform.

Bibliography of research publications on seismology and seismic detection.

AD-636 047 Field 8K, 8G
CFSTI Prices: HC$1.00 MF$0.50
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
VESIAC MONTHLY BULLETIN OF VELA UNIFORM RESEARCH PUBLICATIONS.
15 Jun 66, 16p VESIAC Bull-41

Descriptors: (*Seismology, Bibliographies), Seismographs, Magnetic recording systems, Seismic waves, Structural geology, Geophysics, Earthquakes.

Identifiers: Vela-Uniform.

For abstract, see T 66 17.

AD-636 144 Field 8K, 17J
CFSTI Prices: HC$2.00 MF$0.50
Lincoln Lab., Massachusetts Inst. of Tech, Lexington.
LASA ON-LINE DETECTION, LOCATION AND SIGNAL-TO-NOISE ENHANCEMENT.
Technical note.
by Edward J. Kelly. 1 Jul 66, 35p LL-TN-1966-36
Contract AF 19 (628)-5167, ARPA order-512
ESD-TR-66-245

Descriptors: (*Seismology, *Data processing systems), Detection, Position finding, Epicenter, Earthquakes, Nuclear explosions, Seismometers, Real time, Digital computers.

Identifiers: LASA, Vela-Uniform.

This report describes the results of carrying out a number of seismic signal handling operations in on-line digital equipment at the Large Aperture Seismic Array Data Center in Montana. An appraisal is made of the threshold detection capability of a single LASA sensor by comparison with two well-calibrated stations nearby, UBSO and UMSO. It was found that signals average slightly higher at LASA than at these other stations. When the detection threshold of one LASA sensor is corrected for the predetection processing gain being achieved by current LASA beamformer programs, a LASA detection threshold for event detection by surveillance is established. This number is at a C. and G. S. magnitude of 3.7 for 75% detection or 3.5 for 50% detection by a single LASA for events 30 to 90 degrees away. Some further improvement is possible by more careful on-line beam processing. A combination of automatic event detection and location programs working from individual subarrays is described. This program has been used on single seismometer outputs, giving a 75% threshold for detection and location at a C. and G. S. magnitude around 4.2. Methods for lowering this by various predetection processing schemes are compared. (Author)

AD-478 109 See Field 20A

AD-636 142 See Field 17H

8L. SNOW, ICE, AND PERMAFROST

AD-635 581 Field 8L, 20D
CFSTI Prices: HC$4.00 MF$1.00
Science Engineering Associates, San Marino, Calif.
INTERACTION THEORY FOR A FLOATING ELASTIC SHEET OF FINITE LENGTH WITH GRAVITY WAVES IN WATER OF FINITE DEPTH (INCLUDING A COMPARISON WITH EXPERIMENTAL DATA).
Final rept.
by James A. Hendrickson. Apr 66, 142p
Contract NBy-62185
Proj. Y-F015-11-01-052
NCEL-CR-66.005

Descriptors: (*Floating bodies, Ice), (*Ice, Hydrodynamics), Water waves, Stresses, Elasticity, Fluid dynamic properties, Two-dimensional flow, Fluid flow, Numerical analysis.

Identifiers: Gravity waves.

A theory is developed for the dynamic interaction of a floating elastic plate with incident gravity waves. The theory is two-dimensional and assumes finite dimensions for the plate and a finite depth for the water. The depth of submersion of the plate, however, is neglected. This investigation extends the work of previous investigations by considering the two-dimensional, finite depth aspect of the fluid flow. The theory is adapted to a numerical means of analysis and a computer program is developed to calculate the response parameters of the elastic sheet for given input parameters. Numerical results are obtained for a particular plate and water depth for four different input waves. These conditions were chosen to be the same as those for which model tests were performed under a different study. The experimental results and the theory are then compared and shown to be in reasonable agreement. (Author)

AD-635 963 Field 8L, 11C
CFSTI Prices: HC$1.00 MF$0.50
Naval Civil Engineering Lab., Port Hueneme, Calif.
PROTECTIVE COVERINGS FOR ICE AND SNOW.
Technical rept.
by N. S. Stehle. Jun 66, 17p TR-R-450
Proj. Y-F015-11-01-024

Descriptors: (*Ice, Protective coverings), (*Snow, Protective coverings), (*Protective coverings, Thermal insulation), Degradation, Wood, Particles, Foams, Expanded plastics, Isocyanate plastics, Polar regions, Ice islands.

Summer deterioration of snow and ice surfaces due to high solar radiation and near-melting temperatures hampers the year-round use of natural ice islands and smooth sea-ice areas in the Arctic Ocean, and permanent snow and ice areas in the Antarctic. Sawdust has been used successfully in the California Sierras for protecting compacted-snow areas during periods of alternating above- and below-freezing temperatures and high solar radiation, but its scarcity and shipping bulk preclude its use in polar areas. Urethane foam has proven even more successful than sawdust as a protective covering in laboratory tests during alternating above-and below-freezing temperatures and simulated solar radiation of 0.8 Langley/min (gm-cal sq cm/min). Use of snow or chipped ice on ice surfaces in the Antarctic has generally provided sufficient protection to prevent deterioration and ablation, but warmer environments may preclude use of these natural materials. The use of snow and chipped ice as protective coverings should be exploited and further studies should be made to gain quantitative knowledge on the protective properties of these natural materials and to determine the practical application of urethane foam in polar areas. (Author)

AD-636 272 Field 8L
CFSTI Prices: HC$1.00 MF$0.50
Cold Regions Research and Engineering Lab., Hanover, N. H.
FLUCTUATIONS OF THE TERMINUS OF THE MOLTKE GLACIER.
Technical rept.
by Steven J. Mock. May 66, 12p TR-179
Task IV014501B52A02

Descriptors: (*Glaciers, Greenland), Motion, Velocity, Photogrammetry.

Identifiers: Moltke Glacier.

The terminus position of the Moltke Glacier (one of 3 glaciers which reach tidewater in Wolstenholme Fjord, Greenland) has been mapped from existing maps and from aerial and terrestrial photographs for the years 1946-47, 1954, 1956, 1962, and 1965. With earlier work by J. W. Wright (1939), a fairly detailed record of terminus position exists for the period 1916 to 1965. The glacier has been in nearly continuous retreat during this period, interrupted by a slight advance from 1926 to 1932. Loss of area has been accelerating since 1946-47. Ice flow velocity near the terminus has fluctuated through a known range from 30 m/yr to over 1000 m/yr. The observed changes in velocity may be connected with the arrival of broad kinematic waves near the terminus. The waves could lead to an increase in sliding velocity if the bed of the glacier, at least in the extreme lower reaches, is near or at the pressure melting point. (Author)

8N. TERRESTRIAL MAGNETISM

AD-420 867 Field 8N
CFSTI Price: HC$3.00
RAND Corp., Santa Monica, Calif.
GEOMAGNETISM AND THE IONOSPHERE.
by E. H. Vestine, and J. W. Kern. Oct 63, 39p P-2801
Prepared for the Proceedings of the Conference on Artificial Satellites, held Aug 12-16, 1963 Virginia Polytechnic Inst., Blacksburg, Va.

Descriptors: (*Terrestrial magnetism, Charged particles), (*Ionosphere, Electron density), Upper atmosphere, Magnetic storms, Electric currents, Magnetic fields, Ionization, Van Allen radiation belts, Solar wind, Solar radiation, Diurnal variations, Plasma medium, Ionospheric disturbances, Solar flares.

The geometry of the magnetosphere and the dynamics of energetic particles and plasma trapped within it are discussed in relation to some problems of geomagnetism. Local acceleration of trapped particles is discussed, and the possible origins of electric fields and their roles in this and other magnetospheric phenomena are outlined. It is found that many phenomena of interest may be newly interpreted in terms of a slight extension of the original Chapman--Ferraro theory of geomagnetic storms. (Author)

AD-635 686 **Field 8N**
CFSTI Prices: HC$3.00 MF$0.75
Naval Oceanographic Office, Washington, D. C. Hydrographic Surveys Dept.
GEOMAGNETIC SURVEYS, 1953-1965.
1966, 74p Brochure-3
This pub. revises and replaces the Geomagnetic Survey Information Brochure No. 2.

Descriptors: (*Terrestrial magnetism, Oceanographic data), (*Magnetic fields, Earth), Shipborne, Airborne, Magnetometers, Measurement, Reports, Charts.

Identifiers: MAGNET Project.

Since 1953, the U. S. Naval Oceanographic Office has conducted geomagnetic surveys over various ocean areas of the world. Information on survey locations, dates, navigational control, track patters, data format, and availability of geomagnetic technical reports, charts, and other publications is presented. (Author)

N66-15625 **Field 8N**
CFSTI Prices: HC$1.00 MF$0.50
Hermanus Magnetic Observatory (South Africa).
SOUTH AFRICAN ANTARCTIC SCIENTIFIC RECORDS - MEASUREMENTS OF TOTAL MAGNETIC INTENSITY DURING VOYAGES OF THE 'RSA', DECEMBER 1964 - APRIL 1965.
by H. D. Poole, and A. M. Van Wijk. Aug 65, 21p
Rept. no. B4, Geophysics Ser-1

Descriptors: *Geomagnetic field, *Magnetic measurement.

For abstract, see T 66 17.

AD-635 677 **See Field 22B**

9A. COMPONENTS

AD-469 962 **Field 9A, 9C**
CFSTI Prices: HC$6.00 MF$1.25
Research Triangle Inst., Durham, N. C. Solid State Lab.
DESIGN PARAMETERS AND PROCEDURES FOR FUNCTIONAL ELECTRONIC STRUCTURES.
Technical rept. Jul 64-Jun 65.
by Robert M. Werner. Sep 65, 232p
Contract AF 33 (615)-1998
Proj. AF-4159
Task 415906
AFAL-TR-65-234

Descriptors: (*Electronic equipment, Integrated circuits), (*Integrated circuits, Design), Silicon, Single crystals, Oxidation, Films, Thickness, Impurities, Phosphorus, Gases, Diffusion, Diboranes, Transistors, Electric fields, Boron compounds, Resistors, Diodes (Semiconductor), Electronic switches, Capacitors, Voltage, Gates (Circuits), Fluid flow, Boron, Measurement, Oxides.

Experimental and theoretical research on silicon integrated device structures and on the elements of these structures is discussed. Included are description of oxide film thickness measurement apparatus, data on low temperature silicon oxidation rates, observations on the dependence of oxide growth rate on phosphorus concentration in the silicon, and theoretical treatment of field effect transistor characteristics. The series of reports on Integrated Silicon Device Technology is described and their status given. (Author)

AD-635 539 **Field 9A**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Army, Washington, D. C.
CONTACTLESS SIGNAL SWITCH.
by V. N. Dudchenko-Dudko, and Yu. Ya. Nikulin. 1966, 2p 1-9951
TT-66-61773
Trans. of mono. Beskontaktnyi Kommutator Signalov, 1964 p1-2. Patent (USSR) 163 435.

Descriptors: (*Electronic switches, Diodes (Semiconductor)), USSR, Patents, Signals, Switching circuits, Transformers, Coils, Amplitude modulation.

The contactless switch device contains a shift register in ferrite-diode units. It permits the switching of signals from various transmitters of information to a single communications channel. In the switching device, semi-conducting diodes are switched under a system using a counter switching primary coil of the impulse transformer. This transforms the alternating continuous signals into a pulse train of amplitude-modulated impulses and simultaneously switches them concurrently to one of the potential outlets of each information transmitter.

AD-635 626 **Field 9A**
CFSTI Prices: HC$3.00 MF$0.75
Naval Ammunition Dept., Crane, Ind.
MICRO NOTES. INFORMATION ON MICROELECTRONICS FOR NAVY EQUIPMENTS.
1 Apr 66, 87p Micro-Notes no. MN-16, NAD-Crane-66-264
Prepared for NADC, NASL, and NEL.

Descriptors: (*Naval equipment, *Microminiaturization (Electronics)), (*Integrated circuits, Reliability (Electronics)), Electronic equipment, Semiconductor devices, Digital systems, Airborne, Life expectancy.

Identifiers: AN/ARC-104 (V).

Contents: Post life test evaluation of Siliconix digital semiconductor integrated circuits; post life test evaluation of General Microelectronics digital semiconductor integrated circuits; post life test evaluation of Sylvania digital semiconductor integrated circuits; post life test evaluation of Fairchild digital semiconductor integrated circuits; microcircuit report on the AN/ARC-104 (V); compilation of semiconductor integrated circuits evaluated to date.

AD-635 705 **Field 9A**
CFSTI Prices: HC$2.00 MF$0.50
Microwave Lab., Stanford Univ., Calif.
DEVELOPMENT OF AN X-BAND KLYSTRON POWER TUBE.
Final technical rept.
by H. J. Shaw. Apr 59, 34p ML-604
Contract Nonr-225 (12)
Proj. NR-373-367

Descriptors: (*Klystrons, X-band), (*Microwave amplifiers, Klystrons), Power amplifiers, Radiofrequency power, Tuning devices, Gain, Electron guns.

The purpose of this program has been to provide a tunable, one megawatt, X-band klystron amplifier for a special application. The resulting tube, while providing the high degree of stability and power gain which is characteristic of klystron amplifiers, also provides peak power and average power which are somewhat higher than is otherwise available from pulsed sources at X-band. (Author)

AD-635 807 **Field 9A, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Chalmers Univ. of Technology, Goteburg (Sweden). Research Lab. of Electronics.
MEASUREMENTS ON NONLINEAR SPACE CHARGE WAVES.
Technical rept.
by T. M. Srinivasan. 1 Oct 65, 31p TN-7, RR-55
Contract AF 61 (052)-594
RADC-TR-66-472
Rept. on Nonlinear Microwave Tube studies.

Descriptors: (*Space charges, *Electron beams), Measurement, Alternating current, Nonlinear systems, Sweden.

Results of measurements on the nonlinear ac currents in a velocity modulated confined electron beam are reported. The test vehicle is a two cavity klystron type device with an axially movable demodulator. The ac beam currents at the fundamental and at the two lowest harmonic frequencies have been measured as functions of the distance along the beam for various modulation levels and dc beam currents. The main purpose of the work is to provide experimental data in the transition range between linear space charge wave type and ballistic type behaviour of the ac beam current. The experiments are in good agreement with the nonlinear space charge wave theory. (Author)

AD-635 812 **Field 9A**
CFSTI Prices: HC$1.00 MF$0.50
Texas Instruments, Inc., Dallas.
PRODUCTION ENGINEERING MEASURES (PEM) FOR MILLIWAT LOGIC SEMICONDUCTOR INTEGRATED CIRCUITS.
Quarterly progress rept. no. 5, 1 Jul-30 Sep 65.
by D. W. Brooks, and J. D. Simpson. 30 Sep 65, 12p TI-03-66-56
Contract DA-36-039-AMC-03637 (E)
See also AD-614 599.

Descriptors: (*Microminiaturization (Electronics), Integrated circuits), (*Circuits, Microminiaturization (Electronics)), (*Integrated circuits, Computer logic), Manufacturing methods, Films, Epitaxial growth, Disks, Bonding, Plating, Temperature control, Defects (Materials).

Investigation continued on the use of larger double-epitaxial slices for the milliwatt logic process, including the creation of special masks and handling equipment. In order to improve epitaxial film thickness and resistivity, a new reactor was installed, tested, and evaluated. More than twice as many slices are being produced with the new reactor. Assembly flow was improved by installing a two-unit magnetic heater on all bonding machines, adding a process for nickel and duplex gold plating headers to reduce discoloration, and implementing improved techniques for checking temperature and pressure on the bonding machine. (Author)

AD-635 814 **Field 9A, 13B**
CFSTI Prices: HC$2.00 MF$0.50
Motorola Inc., Phoenix, Ariz. Semiconductor Products Div.
PRODUCTION ENGINEERING MEASURE FOR SILICON OVERLAY TRANSISTORS.
Quarterly progress rept. no. 4, 1 Oct-31 Dec 65.
by Michael Cassidy, and Paul Greer. 31 Dec 65, 37p
Contract DA-36-039-AMC-06156 (E)
Proj. DA-74001
See also AD-635 118.

Descriptors: (*Transistors, Manufacturing methods), (*Silicon, Transistors), Disks, Preparation, Bonding, Diffusion, Storage, Reliability (Electronics), Ultrasonic welding, Chemical milling, Etching, Electric terminals.

Progress during the past quarter has consisted of the following: (1) Wafer Preparation: Processing of 1 1/2-inch slurry-polished and chemically etched wafers using the new preohmic two-step photoresist process. (2) Mask Resolution and Alignment: Vertical and horizontal dimensional inspection of masks to eliminate mask variations. (3) Deionized Water Boil: Evaluation of ultrasonically wire-bonded devices after subjection to deionized water boil. (4) Wire Bonding: Evaluation of units fabricated using a Sono Bond ultrasonic bonder. (5) Diffusion Systems: Final evaluation of the BCl3 system. Emitter diffusion employing a controlled POCl3 source temperature. (6) Reliability Evaluation: Evaluation of completed units. (Author)

AD-635 817 **Field 9A**
CFSTI Price: MF$1.50
Philco Corp., Fort Washington, Pa. Techrep Div.
HANDBOOK OF MINIATURE PARTS AND INTEGRATED CIRCUIT DEVICES FOR ELECTRONIC EQUIPMENT.
15 May 65, 285p
Contract N600 (24)62008
NAVSHIPS-0967-031-100
Supersedes GPO-63-3320.

Descriptors: (*Handbooks, *Miniature electronic equipment), (*Integrated circuits, Handbooks), Electronic equipment, Circuits.

The handbook is divided into two parts. Part I contains the description and illustration of miniature electronic components, such as capacitors, resistors, etc; Part II contains the description and illustration of functional units (circuits), such as amplifiers, oscillators, etc. An explanation of the presentation of material within each part is given at the beginning of each part.

AD-635 831 **Field 9A, 9E**
CFSTI Prices: HC$2.00 MF$0.50
Radio Corp. of America, Somerville, N. J. Electronic Components and Devices.
DEVELOPMENT OF A TRANSISTOR-VARACTOR DIODE CAPABLE OF 5 WATTS OUTPUT AT 2.3 GHz.
Interim technical rept. no. 3, 1 Dec 65-28 Feb 66.
by P. L. McGeough, and H. C. Lee. 28 Feb 66, 27p
Contract AF 33 (615)-2486
See also AD-624 566.

Descriptors: (*Semiconductor devices, Microwave equipment), (*Frequency multipliers, Semiconductor devices), Power amplifiers, Transistors, Varactor diodes, Packaged circuits, Photoengraving, Diffusion, Radiofrequency power.

Significant improvement in the pattern definition and the registration between the various TA2790 photomasks was achieved in a second set of photomasks. Difficulties associated with the definition of the metal pattern have continued. However, modification of the metallizing pattern is expected to eliminate this problem and allow a valid evaluation of the device capability. Continued investigation of various diffusion cycles and epitaxial layer properties has shown an improvement in performance by the use of thin epitaxial layers in conjunction with both shallow base and P ; diffusion depths. Common-emitter amplifier measurements at 770 MHz have shown the flat-top stripline package to be superior to the TO-60 case. The advantages afforded by this package will be more significant during multiplier operation at increased output frequencies. (Author)

AD-635 896 **Field 9A**
CFSTI Prices: HC$4.60 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
WAVE LENGTH LENSES.
Doctoral thesis.
by Gilbert Wilkes. Jun 47, 49p Bumblebee-59
Contract NOrd-7386
Presented to Univ. of Paris, Science Faculty, 5 Dec 46.

Descriptors: (*Electromagnetic lenses, Theory), Experimental data, Dielectrics, Gain, Refractive index, Cylindrical bodies, Lens antennas, Impedance matching, Antenna feeds, Antenna radiation patterns, Antennas.

Identifiers: BUMBLEBEE Project.

The property shown by dielectric blocks of concentrating the energy of electromagnetic waves is similar in many respects to the operation of an ordinary glass optical lens. The energies considered have a much lower frequency than that of light, and the wave lengths are generally such that the lenses have dimensions of the order of a wave length, for the more usual applications. In this they differ radically from optical lenses. A definite phase relationship is found to exist between the energy in the lens and that of free space, and if in the design of the lens, this relationship is not respected, the lens will not yield its maximum concentrating power, or gain. The energy velocity in a lens approaches that of light with a decreasing cross section. The side walls of a lens are found to be effective energy gatherers. The thinner the lens the longer it can be made so as to increase its exposed area. An increased gain results. The index of refraction of the lens material plays a role in this action by its effect on the lens velocity. Experimental data correlating their different properties are given (Author)

AD-635 917 **Field 9A, 9E**
CFSTI Prices: HC$2.00 MF$0.50
New York Univ., N. Y. Lab. for Electroscience Research.
A CLASS OF REALIZABLE MAXIMALLY FLAT MAGNITUDE DRIVING POINT FUNCTIONS.
Technical rept.
by John F. O'Neill, and Mohammed S. Ghausi.
May 66, 37p Scientific-2, TR-400-132
Contract AF 19 (628)-5537
Proj. AF-5628
Task 562806
AFCRL-66-366

Descriptors: (*Distributed amplifiers, *Filters (Electromagnetic wave)), Admittance, Electrical impedance, Functions.

Maximally flat magnitude driving point functions, in spite of easily visualized applications, appear to be less well known than the corresponding transfer functions of Butterworth and other types. This article describes a class of such maximally flat immittances of various order, demonstrates their positive real character, and discusses a particular form of realization, usable up to and including order 5, which makes use of parallel connections of resonant branches for admittances and series connections of dual resonators for impedances. An application is mentioned in which the maximally flat impedance is used as an interstage to achieve a flat amplifier transfer impedance. (Author)

AD-635 936 **Field 9A**
CFSTI Prices: HC$3.00 MF$0.50
Colorado Univ., Boulder. Dept. of Electrical Engineering.
THE EFFECT OF INJECTION SYSTEM DYNAMICS ON LIMITING CURRENT BEHAVIOR IN AN IDEAL PLANAR DIODE.
Technical rept.
by J. C. Twombly, and A. G. Cerveira. 1 May 66, 56p TR-4
Contract Nonr-1147 (06)

Descriptors: (*Electron beams, Dynamics), (*Diodes (Electron tubes), Dynamics), (*Triodes, Dynamics), Mathematical models, Cathodes (Electron tubes), Space charges, Stability, Digital computers, Simulation, Velocity, Electric currents, Gain.

Identifiers: Perveance.

The report describes an improvement in the digital computer simulation of high perveance beams in a region confined by two equipotential parallel planes. The improvement consists in considering a triode model where the first region is an acceleration region or a cathode-grid region and the second region the usual drift region between two equipotential parallel planes. The entrance plane of the drift region (grid plane) is supposed perfectly permeable to the electrons travelling in both directions. The usual assumption of returning electron annihilation at the entrance plane is not made. The improvement was tested by comparing the results with those of the previously studied diode model (AD-603 078). The triode model was also tested against errors introduced by the discrete injection of charges. The use of the triode model gave rise to problems related to the discontinuity of the acceleration when the charges pass through the grid and the effect of the space charge upon the emission of the charges from the cathode. (Author)

AD-635 970 **Field 9A, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Texas Instruments, Inc., Dallas. Semiconductor-Components Div.
PRODUCTION ENGINEERING MEASURE (PEM) FOR TRANSISTOR, PNP, SILICON, SWITCHING TYPE EL-2N (X-12).
Quarterly rept. no. 4, 25 Dec 65-25 Mar 66.
by Larry Lands. Jun 66, 43p Rept. no. 03-66-72
Contract DA-36-039-AMC-06160 (E)
See also AD-632 363.

Descriptors: (*Transistors, Manufacturing methods), Silicon, Gain, Leakage (Electrical), Performance (Engineering), Reliability (Electronics), Gold, Diffusion, Films.

A small adjustment in epitaxial film resistivity was sufficient to raise BVsubCBO and BVsubCEO well within the PEM requirements for these parameters. As a result of the improved breakdown levels, the reverse leakage characteristics for the fourth engineering sample were an order of magnitude better than the third engineering group. The collector saturation voltage increased over the previous samples but 98 percent of the units were still below the 0.25 volt maximum. Delay and rise times did not meet the required minimum values of 3 and 4 nanoseconds, respectively. Typical values were t sub d = 3.4 ns and t sub r = 6.6 ns. Storage time averaged 8.8 ns and fall time was approximately 4.9 ns. Device current gain exerted a major influence on storage time. An attempt to improve current capability with a larger geometry was unsatisfactory due to switching speeds. The use of excess gold in the device structure appeared to produce lower storage time values, but also caused the overall current gain distribution to peak at a lower level. Molybdenum-gold proved to be unacceptable for a contact system on the small device area of the PEM transistor. An evaporation rate monitor system shows promise as a means of eliminating operator error during high volumn metalization procedures. The system offers an automation capability as well as close control of the evaporation rate. (Author)

AD-636 177 **Field 9A, 14D**
CFSTI Prices: HC$2.00 MF$0.50
Navy Marine Engineering Lab., Annapolis, Md.
THERMAL AGING STUDIES OF SOLENOID COIL INSULATION SYSTEMS.
Research and development rept.
by John A. Kimball, and John F. Tobin. Jun 66, 32p MEL-13/66
Proj. S-F013-12-04
Task 4535

Descriptors: (*Electric insulation, Solenoids), (*Aging (Materials), Electric insulation), Life expectancy, Epoxy plastics, Encapsulation, Thermal stresses, Vibration, Humidity, Electrical properties, Electric wire, Coils.

A procedure consisting of heat aging, vibration, humidification, and voltage stress has been devel-

oped for studying thermal aging characteristics of solenoid coil insulation systems. The procedure was applied to eight experimental epoxy-encapsulated solenoid coil insulation systems, and the thermal life of the eight systems was established. The procedure is recommended for general use in establishing the thermal life of coil insulation systems. (Author)

AD-636 179 **Field 9A, 13M, 20A**
CFSTI Prices: HC$2.00 MF$0.50
Naval Civil Engineering Lab., Port Hueneme, Calif.
CONSTRUCTION AND EVALUATION OF A PROTOTYPE ELECTROMAGNETICALLY SHIELDED ROOM.
Technical rept., Jul 64-Jan 65.
by H. A. Lasitter. Jun 66, 44p R-454
Proj. Y-F006-09-02-211

Descriptors: (*Structures, *Electromagnetic shielding), Radiofrequency, Sheets, Steel, Zinc coatings, Acoustic insulation, Effectiveness, Construction, Soldered joints.

An electromagnetically shielded room composed of 20-gage sheet-metal wall material with continuously soldered seams was constructed and evaluated at the Naval Civil Engineering Laboratory. The 20 x 20 x 8-foot room is a prototype model designed as a basis for determining specifications for the construction of large shielded room installations. Electromagnetic shielding evaluation of the room was performed in accordance with MIL STD-285, along with additional measurements at 1.0, 2.5, and 9.0 Gc/sec. The lowest value of shielding effectiveness was 65 decibels at 14 kc/sec. Construction techniques for such design features as sheet-metal joints, soldered seams, powerline filtering, ventilation ducts, and cable raceways are discussed. Techniques for providing penetrations into the room for gas, water, and sewage were investigated. Measurements of the effect of small, controlled openings into the room were determined. The acoustic shielding properties of the room are also given in this report. (Author)

AD-636 193 **Field 9A, 13H, 11F**
CFSTI Prices: HC$2.00 MF$0.50
Naval Applied Science Lab., Brooklyn, N. Y.
INVESTIGATION OF PLATINGS OF ELECTRICAL CONTACTS.
Technical memo.
8 Jul 66, 29p IED-20, TM-1

Descriptors: (*Electroplating, *Electric connectors), Naval equipment, Environmental tests, Corrosion, Corrosion inhibition, Resistance (Electrical), Films, Gold, Silver, Nickel, Copper, Rhodium, Performance (Engineering).

MIL-C-26636 size 16 and 20 pin and socket contacts were electroplated with gold over silver, gold over nickel, gold over copper, rhodium over nickel and rhodium over silver. Plated contacts were wired and assembled in a modified louvered Stevenson Screen and installed at the NASL marine environmental site at Ft. Tilden, N.Y. mounted on a supporting structure facing the ocean without obstruction, approximately 500 feet from the shore line and 40 feet above M.L.W. Analysis of tarnish films deposited on exposed copper plates during the initial two months at the Ft. Tilden test site indicates a suitable marine environment free of sulphide contamination. Contact resistance measurements on contacts mated 100 times as compared to contacts mated once, prior to exposure, show no significant difference except for a 30% increase for those plated with rhodium over nickel. The contact resistance measurements made during the first two months of exposure indicate a slight increase in the average contact resistance of all contacts. (Author)

AD-636 267 **Field 9A, 20L, 20C**
CFSTI Prices: HC$1.00 MF$0.50
Navy Underwater Sound Lab., New London, Conn.
THE EFFECT OF AMBIENT BACKGROUND ON THE PERFORMANCE OF LEAD SULFIDE AND SILICON PHOTODETECTORS.
Research rept. for 1963-1965.
by Gary N. Motin. 19 Jul 66, 24p USL-752
Proj. SF-006-05-12
Task 7009

Descriptors: (*Photoelectric cells (Semiconductor), *Demodulators), Temperature, Silicon, Lead compounds, Sulfides, Diodes (Semiconductor), Performance (Engineering), Signal-to-noise ratio, Photoelectric materials.

Identifiers: Photodetectors, Lead sulfide.

This report presents a summary of several years of investigation into characteristics of chemically deposited, lead sulfide, near-infrared photoconductors and broad-area, diffused junction, silicon, near-infrared photodiodes exposed to actual and simulated ambient background conditions. Among the parameters tested were voltage-current characteristics, signal and noise characteristics, and frequency response. The silicon operational techniques tested were voltage amplification, current amplification, reverse biasing, transformer coupling, and inductance coupling. It was found that (1) the lead sulfide photoconductive cell still retains its position as an important photodetector for use in low frequency, near-infrared applications, and (2) maximum performance from the diffused junction silicon photodiode is realized when the detector is operated under DC short-circuit conditions. A theoretical discussion of the operation of the two detectors is also presented. (Author)

AD-636 283 **Field 9A, 14D**
CFSTI Prices: HC$3.00 MF$0.75
Radio Corp. of America, Camden, N. J. Communications Systems Div.
MICROMODULE LIFE TEST PROGRAM.
Progress rept. no. 5, 17 Sep 65-15 Apr 66.
by F. E. Farmer. 15 Apr 66, 65p
Contract DA-36-039-AMC-01462 (E)
See also AD-632 839.

Descriptors: (*Microminiaturization (Electronics), *Modules (Electronic)), Life expectancy, Failure (Electronics), Analog systems, Digital systems, Reliability (Electronics).

Progress is reported on a micromodule life test program to determine the Mean-Time-To-Failure (MTTF) of a typical analog and a typical digital micromodule when tested for ten-thousand (10,000) hours under load at elevated temperature. The causes of micromodule failure during test are to be determined and reported to each supplier of test modules, and at the conclusion of testing, drift characteristics of each micromodule parameter are to be studied to determine attainable tolerance limits for these parameters.

AD-636 285 **Field 9A, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Texas Instruments Inc., Dallas, Tex.
PRODUCTION ENGINEERING MEASURES (PEM) FOR A GERMANIUM MICROWAVE TRANSISTOR.
Quarterly progress rept. no. 7, 31 Dec 65-31 Mar 66.
by C. L. White, K. B. Landress, and E. Gonzalez-Correa. 31 Mar 66, 42p TI-03-66-60
Contract DA-36-039-AMC-03632 (E)
Proj. 74057
See also AD-633 976.

Descriptors: (*Transistors, Manufacturing methods), (*Microwave equipment, Transistors), (*Germanium, Transistors), S band, Noise (Radio), Processing, Resistance (Electrical), Gain, Performance (Engineering).

The emitter window mask and the emitter 'Top-Hat' mask alignment pattern was redesigned in order to aid the operator in accomplishing a faster and more precise alignment of the emitter 'Top-Hat' mask over the KMER emitter window. A precise alignment of the 'Top-Hat' pattern is an essential technique in defining the emitter region of the active device prior to the emitter alloying process. The abnormally low value for the intrinsic f sub T of PEM devices fabricated during the seventh quarter of the contract was corrected by using collector epitaxial material with a lower than normal resistivity value. A study of the problem of abnormally low intrinsic f sub T devices revealed that although the measured resistivity of the epitaxial collector region was as specified, the avalanche breakdown voltage of the fabricated collector-base diode was abnormally high, which in turn indicates an abnormally high value of collector resistivity. Excessive electrical opens were experienced between the emitter and base contacts of the active device during the seventh quarter of this contract. It is believed that the opens problem can be expediently solved by a technique involving the misalignment of the expanded contact 'Top-Hat' pattern during the KMER expanded contact define and etch operation. In addition to the misalignment technique for reducing the number of emitter-base opens, a thinner second silicon dioxide deposition prior to the fabrication of the expanded contact may also aid in reducing open devices. (Author)

AD-636 286 **Field 9A**
CFSTI Prices: HC$6.00 MF$1.50
Brown Engineering Co., Inc., Huntsville, Ala.
NEGATIVE RESISTANCE STUDY - PHASE I.
by Curtis Culwell, Travis C. Williams, E. H. Devletoglou, and L. E. Niemann Jr. Jun 66, 276p
ESD-100
Contract AF 30 (602)-3780
Proj. AF-4519
Task 451901
RADC-TR-66-231

Descriptors: (*Negative resistance circuits, *Semiconductor devices), Tunnel diodes, Varactor diodes, Diodes (Semiconductors), Parametric amplifiers, Microwave frequency, Microwave amplifiers, Frequency converters, Modulators, Electronic switches, Limiters, Demodulators.

The negative resistance study examines the theory of operation, the capabilities and limitations of negative resistance devices. A survey of the basic semiconductor physics of the tunnel diode, varactor diode and step recovery diode, the equivalent circuit and the equations whose parameters are the parasitic elements of the diode and govern the design criteria are presented. Some applications of the tunnel diode, varactor diode and step recovery diode as microwave devices are: amplifiers, oscillators, frequency converters, modulators, switches, limiters, and detectors. Some of the electrical characteristics of these devices are presented. Experimental results obtained from parametric amplification using a step recovery diode are shown. Based on these results, parametric amplification by charge storage diodes is feasible. Information gained as a result of this study will be useful in the use or development of various negative resistance devices, which may yield significant improvement in communication systems performance. (Author)

N66-13292 **Field 9A**
CFSTI Prices: HC$1.00 MF$0.50
General Electric Co., Schenectady, N. Y. Power-tube Dept.
HIGH-TEMPERATURE, GAS-FILLED, CERAMIC RECTIFIERS, THYRATRONS, AND VOLTAGE-REFERENCE TUBES.
Quarterly progress rept. no. 3, 15 Jun-14 Sep 65.
by E. A. Baum. 1965, 17p
Contract NAS3-6469
NASA-CR-54795

Descriptors: *Ceramics, *Electron tube, *Rectifier, *High temperature environment, *Thyratron.

For abstract, see T 66 17.

N66-15592 **Field 9A**
CFSTI Prices: HC$5.00 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.
AN ADVANCED THERMOELECTRIC COMPONENT DEVELOPMENT PROGRAM.
Interim progress rept.
by W. E. Kortier. 17 Sep 65. 110p BAT-5-9160-1
Contract NAS5-9160
NASA-CR-69442

Descriptors: *Computer program, *Thermal insulation, *Thermoelectric material, *Lead telluride, *Silicon compound.

N66-17471 **Field 9A**
CFSTI Prices: HC$4.00 MF$0.75
Electro-mechanical Research, Inc., Princeton, N. J.
STERILIZABLE PHOTOMULTIPLIER TUBES.
Final rept.
by E. J. Dumas, and M. Rome. Dec 65, 114p
Contract NAS7-100
NASA-CR-70466

Descriptors: *Environmental testing, *Photomultiplier, *Space program, *Sterilization.

N66-18480 **Field 9A**
CFSTI Prices: HC$2.00 MF$0.50
General Dynamics/Astronautics, San Diego, Calif.
COMPUTER AIDS FOR WORST CASE ELECTRONIC CIRCUIT DESIGN.
by N. H. Kennedy, L. P. Silvernale, and A. T. Wells. 15 Jun 64, 28p GD/A-BTD-64-113
Contract NAS3-3232
NASA-CR-54668

Descriptors: *Computer program, *Digital computer, *Electronic equipment, *Switching circuit, *Linear circuit.

AD-635 583 **See Field 18H**

AD-635 605 **See Field 20C**

AD-635 607 **See Field 14D**

AD-635 870 **See Field 13H**

AD-635 913 **See Field 17I**

AD-636 249 **See Field 10B**

AD-636 261 **See Field 9E**

9B. COMPUTERS

AD-635 703 **Field 9B**
CFSTI Prices: HC$1.00 MF$0.50
Army Materials Research Agency, Watertown, Mass. Materials Engineering Div.
ANALOG COMPUTER FOR TRUE STRESS-STRAIN TENSION TESTING.
Technical rept.
by Albert A. Anctil, and John Nunes. Jun 66, 12p
Proj. DA-1C024401A328
Task 36743
AMRA-TR-66-15

Descriptors: (*Analog computers, Data processing systems), (*Data processing systems, Tensile properties), Graphics, Data, Test equipment, Measurement.

A special purpose analog computer is utilized to obtain autographic plots of linear and logarithmic true stress-strain data during tension testing. The testing system, operational procedure, signal flow diagram, and sample curves are shown and discussed. Versatility and ease of operation make this computer a valuable addition to materials research and testing laboratories. (Author)

AD-635 768 **Field 9B, 19D, 12B**
CFSTI Prices: HC$2.00 MF$0.50
Naval Weapons Lab., Dahlgren, Va.
A PROGRAM FOR SUMMARIZING DAMAGES COMPUTED BY THE COBRA SYSTEM.
Technical memo.
by Patricia A. Womble. Jul 66, 33p K-38/66

Descriptors: (*Programming (Computers), *Damage), (*Nuclear explosions, Damage), Mathematical models.

Identifiers: COBRA.

A detailed description, including flow diagrams, is given for a program used to summarize damages computed by the COBRA (Comprehensive Blast and Radiation Assessment) System to a facility or populated target. The program will be called COBRA 6. (Author)

AD-635 964 **Field 9B**
CFSTI Prices: HC$3.00 MF$0.75
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
EFFECT OF FREQUENCY VARIATION ON THE ACCURACY OF A SYNCHRO-TO-DIGITAL CONVERTER.
Technical memo.
by K. S. Bonwit. Apr 66, 88p TG-818
Contract NOw-62-0604-c

Descriptors: (*Analog-to-digital converters, Errors), Frequency, Synchros, Digital-to-analog converters.

Identifiers: Synchro-to-digital converters, Theses.

A description is presented of the operation of a particular synchro-to-digital converter. A synchro-to-digital converter is a special form of an analog-to-digital converter which accepts at its input an analog three-wire synchro input with voltages representing the synchro shaft angle and provides a binary digital output which represents that angle. An analytical expression is developed which permits the determination of the error in the synchro-to-digital converter (on the basis of stated assumptions). The effects of the third-harmonic and quadrature signal components of the synchro input signal have been included. The magnitudes of these components may be varied by varying corresponding parameters in the expression. The errors for a wide range of frequencies were calculated in a general-purpose digital computer, and the results are presented graphically. An explanation of the cause of the error variation is presented. In addition, there is a discussion of the effects on the converter error of the variation of the parameters in the analytical expression. (Author)

AD-635 966 **Field 9B, 13F**
CFSTI Prices: HC$3.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge.
TRAFFIC CONTROL IN A MULTIPLEXED COMPUTER SYSTEM.
Doctoral thesis.
by Jerome Howard Saltzer. Jun 66, 87p MAC-TR-30
Contract Nonr-4102 (01),
Proj. NR-048-189
Rept. on Proj. MAC.

Descriptors: (*Traffic, Control), (*Computers, Traffic), Scheduling, Multiple operation.

Identifiers: MAC project.

The thesis describes a scheme for processor multiplexing in a multiple user, multiple processor computer system. The scheme is based upon a distributed supervisor which may be different for different users. The processor multiplexing method provides smooth inter-process communication, treatment of input/output control as a special case of inter-process communication, and provision for a user to specify parallel processing or simultaneous input/output without interrupt logic. By treatment of processors in an anonymous pool, smooth and automatic scaling of system capacity is obtained as more processors and more users are added. The basic design has intrinsic overhead in processor time and memory space which remains proportional to the amount of useful work the system does under extremes of system scaling and loading. The design is not limited to a specific hardware implementation; it is intended to have wide application to multiplexed, multiple processor computer systems. The processor traffic controller described here is an integral part of Multics, a Multiplexed Information and Computing Service.

AD-636 032 **Field 9B**
CFSTI Prices: HC$3.00 MF$0.75
System Development Corp., Santa Monica, Calif.
ONE-WAY STACK AUTOMATA.
Interim scientific rept.
by Seymour Ginsburg, Sheila A. Greibach, and Michael A. Harrison. 22 Apr 66, 61p TM-738/025/00, Scientific-10
Contract AF 19 (628)-5166
Proj. AF-5632
Task 563205
AFCRL-66-398
Prepared in cooperation with Harvard Univ., Cambridge, Mass. and California Univ., Berkeley.

Descriptors: (*Automata, *Mathematical logic), Programming languages, Artificial intelligence, Context free grammars.

A number of operations which either preserve sets accepted by one-way stack automata or preserve sets accepted by deterministic one-way stack automata are presented. For example, sequential transduction preserves the former; set complementation, the latter. Several solvability questions are also considered. (Author)

AD-636 049 **Field 9B**
CFSTI Prices: HC$1.00 MF$0.50
Bolt, Beranek and Newman, Inc., Cambridge, Mass.
STORAGE MANAGEMENT IN LISP.
by Daniel G. Bobrow. Jun 66, 20p Scientific-4, BBN-1423
Contract AF 19 (628)-5065, ARPA Order-627
Proj. AF-8668
AFCRL-66-426

Descriptors: (*Programming languages, *Data storage systems), Programming (Computers), Compilers, Search theory, Computer logic, Data processing systems, Computers.

Identifiers: LISP.

Storage allocation, maintenance, and reclamation are handled automatically in LISP systems. Storage is allocated as needed, and a garbage collection process periodically reclaims storage no longer in use. A number of different garbage collection algorithms are described. A common property of most of these algorithms is that during garbage collection all other computation ceases. This is an untenable situation for programs which must respond to real time interrupts. The paper concludes with a proposal for an incremental garbage collection scheme which allows simultaneous computation and storage reclamation. (Author)

AD-636 097 **Field 9B**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
A SIMPLE PROOF OF A THEOREM ON SELF-SYNCHRONIZING AUTOMATA.
by Dale M. Landi. Jul 66, 5p P-3242-1

Descriptors: (*Theorems, *Automata), Mathematical logic, Probability.

A short proof is offered for verifying that a finite state, completely specified automation is syn-

chronized with probability 1 only if there exists a universal synchronizer for the automation. (Author)

AD-636 098 **Field 9B**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
OCTAL FRACTION CONVERSION TABLES.
by Paula M. Oldfather. Jul 66, 18p RM-5051-PR
Contract AF 49 (638)-1700

Descriptors: (*Programming (Computers), *Real numbers), Tables, Simulation.

Identifiers: Octal conversion.

This memorandum presents a set of three tables for the rapid conversion of real numbers from the floating point octal representation used internally by digital computers to the decimal representation employed by human beings. In addition to the standard octal-to-decimal conversion, octal fractions are further converted to decimal hours and hours and minutes. Thus, while the memorandum should prove useful to anyone who works closely with digital computers and is required to make such conversions, it should be especially valuable to simulation programmers. (Author)

AD-636 189 **Field 9B**
CFSTI Prices: HC$10.20 MF$3.00
Navy Electronics Lab. San Diego, Calif.
CONVERTER COMPENDIUM.
by G. A. Brown. 1 Jul 66, 721p

Descriptors: (*Input-output devices, Specifications), Analog-to-digital converters, Digital-to-analog converters.

This compendium is based on in-house and commercial literature on the following types of converters: Shaft to digital (contact and noncontact), Analog to digital, Digital to analog, Synchro to digital, Digital to synchro, Voice to digital. Major functional, electrical, and physical characteristics of the converters are described.

AD-636 274 **Field 9B**
CFSTI Prices: HC$3.00 MF$0.75
Illinois Univ., Urbana. Coordinated Science Lab.
ON THE DESIGN AND TESTING OF SELF-DIAGNOSABLE COMPUTERS.
by Ralph A. Marlett. Jul 66, 72p Rept no. R-293
Contract DA-28-043-AMC-00073 (E), Grant NSF-GK-36
Proj. DA-20014501B31F

Descriptors: (*Digital computers, Design), Malfunctions, Determination, Tests, Computer logic, Programming (Computers), Failure (Mechanics), Circuits, Control sequences.

Identifiers: Self-diagnosing computers.

A new approach for deriving self-diagnosis programs for digital computers is investigated. The derivation procedure is based on only a micro-order description of the computer to be tested. The detailed logic information is not needed. This approach is made possible by 'standardizing' computer realization techniques by means of a set of design principles. The thesis describes such a set of design principles which guarantees the existence of a relationship between the behavior of a computer under a large number of failures and alterations of the micro-order specification for that computer. The micro-order 'alterations' are then used to characterize a computer under failure for every machine instruction so that test programs can be written which check for over 93 per cent of all failures. Such programs check for 'symptoms of failure' rather than the actual component which caused the failure since the logic is not necessarily assumed to be known. This procedure can be programmed so that diagnostic programs can be generated by a computer. An experiment is also described which substantiates the theoretical findings. (Author)

DP-1027 **Field 9B, 18K**
CFSTI Prices: HC$4.00 MF$0.75
Du Pont De Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
USERS MANUAL FOR SRL-HERESY I. HETEROGENEOUS REACTOR SYSTEMS CODE FOR THE IBM 704.
by Donald R. Finch. Mar 66, 122p
Contract AT (07-2)-1

Descriptors: (*Programming (Computers), Reactor lattice parameters), (*Heterogeneous reactors, Reactor lattice parameters).

For abstract, see N 20 15.

NAA-SR-11355 **Field 9B, 18D, 18I**
CFSTI Prices: HC$1.00 MF$0.50
Atomics International, Canoga Park, Calif.
ANALOG COMPUTER FOR THE ARGON FLUX MONITOR.
by K. H. Kline. 25 May 66, 21p
Contract AT (11-1)-GEN-8

Descriptors: (*Analog computers, Neutron flux), (*Neutron flux, Analog computers).

For abstract, see N 20 15.

N66-15727 **Field 9B**
CFSTI Prices: HC$4.00 MF$1.00
Stanford Univ., Calif. Dept. of Genetics.
AN OPERATING SYSTEM FOR THE LINC COMPUTER.
by R. K. Moore. 1 Nov 65, 175p IRL-1038
Grants NsG-81-60, AF-AFOSR-886-65
NASA-CR-69534

Descriptors: *Computer program, *Data handling system, *Digital computer, *Laboratory apparatus.

N66-15984 **Field 9B**
CFSTI Prices: HC$3.00 MF$0.50
New York Univ., N. Y. Lab. for Electroscience Research.
GRAPH PAK I-A THREE-DIMENSIONAL MANIPULATION PROGRAM.
by M. Adamowicz. 10 Sep 65, 52p TN-400-24
Grant NGR-33-016-038
NASA-CR-69665

Descriptors: *Graphic arts, *Computer program, *Plotting instrument.

N66-18476 **Field 9B**
CFSTI Prices: HC$4.00 MF$1.25
General Dynamics/Astronautics, San Diego, Calif.
LICOS-AN INTERPRETIVE SIMULATION OF THE LIBRASCOPE COMPUTER, MODEL 1 AND MODEL 3.
by M. McLennan. 20 Dec 63, 131p GD/A-63-1141
Contract NAS3-3232
NASA-CR-54519

Descriptors: *Data conversion, *Electronic equipment, *Computer simulation, *Function generator, *Telemetry.

SLAC-56 **Field 9B, 20G**
CFSTI Prices: HC$3.00 MF$0.50
Stanford Linear Accelerator Center, Stanford Univ., Calif.
A COMPUTER CODE FOR VARIABLE PERMEABILITY MAGNETOSTATIC FIELD PROBLEMS.
by E. A. Burfine, L. R. Anderson, and H. Brechna. Apr 66, 54p
Contract AT (04-3)-515

Descriptors: (*Programming (Computers), Magnets), (*Magnets, Design).

Identifiers: NUTCRACKER.

For abstract, see N 20 15.

AD-432 297 See Field 20E
AD-444 956 See Field 20E
AD-452 259 See Field 20E
AD-457 984 See Field 20E
AD-460 305 See Field 12A
AD-465 088 See Field 5H
AD-468 433 See Field 20E
AD-476 443 See Field 12A
AD-635 822 See Field 6R
AD-635 849 See Field 17B
AD-635 876 See Field 15G
AD-635 901 See Field 5I
AD-635 934 See Field 5G
AD-636 170 See Field 5E
AD-636 212 See Field 5I
AD-636 251 See Field 5H
AD-636 258 See Field 13H
BNWL-218 See Field 5B
N66-16016 See Field 6P
PB-169 969 See Field 5B
PB-170 443 See Field 13B
PB-170 603 See Field 5B
PB-170 688 See Field 6E

9C. ELECTRIC AND ELECTRONIC ENGINEERING

N66-13168 **Field 9C**
CFSTI Price s: HC$1.00 MF$0.50
Pennsylvania State Univ., University Park.
A GENERAL STABILITY CRITERION FOR FEEDBACK SYSTEMS.
by A. M. Krall. 1964, 10p
Contract NGR-39-009-041
NASA-CR-68544

Descriptors: *Differential equation, *Feedback, *Linear equation, *Nonlinear equation, *System stability.

N66-16089 **Field 9C**
CFSTI Prices: HC$4.00 MF$1.00
Westinghouse Electric Corp., Lima, Ohio.
FINAL REPORT FOR A BRUSHLESS DC TORQUE MOTOR.
by R. E. Skamfer, and W. W. Yates. Feb 66, 153p
Contract NAS5-3934
NASA-CR-374

Descriptors: *Direct current (DC), *Electric motor, *Torque motor.

N66-16596 **Field 9C**
CFSTI Prices: HC$3.00 MF$0.75
Michigan Univ., Ann Arbor.
THE NECESSARY CONDITIONS FOR AMPLIFICATION OF AN ELECTROMAGNETIC WAVE INTERACTING WITH A DRIFTING ELECTRON STREAM.
Technical rept.
by H. C. Hsieh, and J. E. Rowe. Nov 65, 68p
Rept. no. 06621-4-T, TR-88
Grant NsG-696
NASA-CR-70143

Descriptors: *Electromagnetic wave, *Electron beam, *Traveling wave amplifier, *Wave interaction.

N66-18457 **Field 9C**
CFSTI Prices: HC$2.00 MF$0.50
Connecticut Univ., Storrs.
CONTROL OF TIME VARIABLE, NONLINEAR MULTIVARIABLE SYSTEMS USING LIAPUNOV'S DIRECT METHOD.
by D. P. Lindorff, and R. V. Monopoli. Mar 66, 27p
Grant NsG-309-63
NASA-CR-407

Descriptors: *Nonlinear system, *Liapunov function, *Matrix algebra.

N66-18461 **Field 9C**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
HIGH-POWER-LEVEL TEMPERATURE CONTROLLER FOR SPACE FLIGHT APPLICATIONS.
by W. T. Harrigill, and L. J. Smith. Mar 66, 26p
NASA-TN-D-3307

Descriptors: *Semiconductor device, *Solid state device, *Space environment, *Temperature control.

PB-170 477 **Field 9C, 10B**
CFSTI Prices: HC$1.50 MF$0.75
Bureau of Reclamation, Denver, Colo. Electric Power Branch.
LINE SWITCHING TESTS 345-KILOVOLT GLEN CANYON - PINNACLE PEAK LINE; COLORADO RIVER STORAGE AND PARKER-DAVIS PROJECTS; OCTOBER 2-4, 1965.
by G. W. Cleaveland, and R. R. Fillenberg. 17 Nov 65, 76p Rept. no. EP-15

Descriptors: (*Electric power production, Transmission lines), (*Transmission lines, Electric switches), Power plants (Establishments), Circuit breakers, Electric relays, Electric terminals, Power transformers, Voltage, Remote control systems, Lightning arresters.

During field tests for energization of the 345-kv Glen Canyon-Pinnacle Peak Line No. 1 and subsequent closing of the loop (Glen Canyon-Pinnacle Peak-Four Corners) involving the line, no limiting conditions with respect to switching surges, dynamic overvoltages or arrester sparkover were encountered. Dynamic overvoltages of 1.8 and 2.14 per unit were recorded at Glen Canyon and Pinnacle Peak, respectively, when the line was energized from two isolated units at Glen Canyon. Switching surges in the order of 2.5 per unit volts and a 19% Ferranti rise in steady state voltage at Glen Canyon were measured when the line was energized from Pinnacle Peak. Switching surges were minimized during the test series by (1) accurate adjustment of breaker contacts for close coordination during closing, (2) attenuation of switching surges over this long line, and (3) by energizing the line from a relatively weak bus. The oscillating charge, (43.5 cycles per second) trapped on the line following tripping decays to 37% of initial voltage in approximately 0.75 seconds. An arrester spill at 2.0 per unit volts was recorded on the 230-kv side of the 230/345-kv autotransformer at Pinnacle Peak when energizing the line at full voltage from Glen Canyon. Transfer trip features operated satisfactorily. Remote control, two-terminal testing was utilized. (Author)

PB-170 596 **Field 9C, 14B**
CFSTI Prices: HC$6.00 MF$0.50
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
TIME-MARK GENERATOR TEKTRONIX 180A OR AN/USM-108 FAIRCHILD 781, 781A OR 0-1293/U.
Technical manual instrument calibration procedure, AG-47.
15 Mar 66, 13p
NAVWEPS-17-20AG-47
This publication supersedes NAVWEPS-17-20AG-47 dated 1 Sep 64, PB-171 241.

Descriptors: (*Test equipment (Electronics), Calibration), (*Pulse generators, Calibration), Timing devices, Time signals, Signal generators, Test methods, Instruction manuals.

Identifiers: AN/USM-108, Time-mark generators.

The procedure describes the calibration of the Tektronix 180A, AN/USM-108, Fairchild 781 or 781A, or 0-1293/U time-mark generator. The instrument consists of a precison 1 MHz crystal oscillator and frequency dividing and multiplying systems. The frequency dividing system produces marker pulses with various spacings, which may be selected separately or superimposed to form a timing comb, as well as accurate trigger pulses which may be used to synchronize oscilloscope displays. The multiplying system provides fixed-frequency sine-wave signals.

PB-170 598 **Field 9C, 14B, 17G**
CFSTI Prices: HC$3.00 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
NAVIGATIONAL COMPUTER TEST SET AN/ASM-209.
Handbook, Operation and Service Instructions, Calibration Procedures, and Illustrated Parts Breakdown.
15 Feb 66, 49p NAVWEPS-16-30ASM209-1

Descriptors: (*Test equipment (Electronics), Calibration), (*Navigational computers, Test equipment (Electronics)), Operation, Handbooks, Maintenance, Instruction manuals, Electronic equipment.

Identifiers: AN/ASM-209.

The publication comprises operation and service instructions and calibration procedures with illustrated parts breakdown for Navigational Computer Set AN/ASM-209 manufactured by Loral Electronic Systems. The test set is a portable test set used to monitor the ground track outputs of Navigational Computer Group AN/ASA-13 (*) and Navigational Computer Set AN/AYK-2 for a fixed time increment and display these outputs in nautical miles by means of servo operated mechanical counters.

PB-170 632 **Field 9C, 14B**
CFSTI Prices: HC$3.00 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
RADAR TEST SETS AN/SPM-5, AN/SPM-5A.
Technical manual, instrument calibration procedure GQ-26.
15 Apr 66, 37p NAVWEPS-17-20GQ-26

Descriptors: (*Test equipment (Electronics), Calibration), (*Radar equipment, Test equipment (Electronics)), Power meters, Frequency meters, Spectrum analyzers, Signal generators, Test methods, Instruction manuals.

Identifiers: AN/SPM-5, Radar test sets.

The procedure describes the calibration of radar test sets AN/SPM-5 and AN/SPM-5A. The instrument is a special purpose, portable test set designed for use with radar systems operating in the frequency range of 5200 to 5900 MHz. It combines the functions of a power meter, frequency meter, spectrum analyzer, signal generator, and a general purpose synchroscope. (Author)

PB-170 748 **Field 9C, 14B**
CFSTI Prices: HC$6.00 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
ELECTRONIC VOLTMETER TRUE ROOT MEAN SQUARE 320A.
Technical manual instrument calibration procedure, AE-50.
1 Apr 66, 21p NAVWEPS-17-20AE-50

Descriptors: (*Voltmeters, Calibration), Instruction manuals, Measuring devices (Electrical + electronic).

PB-170 753 **Field 9C, 14B**
CFSTI Prices: HC$3.00 MF$0.50
Bureau of Naval Weapons, Washington, D. C.
PULSE GENERATOR MODEL 132A-8 (EH RESEARCH LABORATORIES, INC.).
Technical manual instrument calibration procedure, AG-95.
30 Apr 66, 21p NAVWEPS-17-20AG-95

Descriptors: (*Pulse generators, Calibration), Instruction manuals.

AD-458 320 **See Field 14B**

AD-469 962 **See Field 9A**

PB-170 479 **See Field 13B**

PB-170 612 **See Field 14B**

9D. INFORMATION THEORY

AD-635 809 **Field 9D, 6D, 5B**
CFSTI Prices: HC$3.00 MF$0.75
General Technical Services, Inc., Yeadon, Pa.
INFORMATION SCIENCE: OUTLINE, ASSESSMENT, INTERDISCIPLINARY DISCUSSION.
Rept. for Jun 65-Jun 66.
by A. S. Iberall. Jun 66, 91p
Contract DA-49-092-ARO-114
Proj. DA-2T023201A710-03-009

Descriptors: (*Information theory, *Cybernetics), Bionics, Coding, Pattern recognition, Entropy, Statistical mechanics.

This report provides an assessment and introduction to the interdisciplinary literature of three aspects of Information Science, in annotated bibliography form. These are: communication networks; human information processes, principally language and information retrieval; and the large cybernetic systems such as the human brain and central nervous system. (Author)

AD-635 944 **Field 9D, 5G, 17B**
CFSTI Prices: HC$4.00 MF$0.75
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
STUDY AND ANALYSIS OF SPEECH PARAMETERS AND BANDWIDTH COMPRESSION TECHNIQUES.
Final rept. 1 Jul 65-30 Jun 66.
by Berry O. Pyron, and Frank R. Williamson Jr.
25 Jul 66, 108p
Contract DA-49-092-ARO-111
Projs. A-876, 2T023201A710
See also AD-600 863, AD-616 644.

Descriptors: (*Speech recognition, Bandwidth), (*Speech, Analysis), Gates (Circuits), Speech transmission, Linguistics, Display systems, Perception, Voice communication systems, Sound pitch, English language.

Identifiers: Phonemes, Consonants.

Properties of the six stop consonants of English speech were studied with the aid of electronic gating circuitry and associated display equipment. The apparatus made possible transient-free blanking of an adjustable-duration section at adjustable location in an input test utterance recorded on a tape loop. Alternatively, a section of the utterance could be excised and heard in isolation from its context. Output gated speech was evaluated subjectively by listeners. Results provide information on the distribution in time of recognition clues to perception of the stop consonants, and on the

dependence of this distribution upon such factors as clarity of enunciation. Bandwidth-compression experiments were also conducted, using a system to reconstruct speech from narrow-band transmitted analogs of zero-crossing rate, amplitude-envelope, and pitch period. Results suggest that a combination of the three analogs is preferable to previous operation without pitch. (Author)

AD-636 037 **Field 9D, 12A, 9E**
CFSTI Prices: HC$1.60 MF$0.50
RAND Corp., Santa Monica, Calif.
MINIMAL k-ARC-CONNECTED GRAPHS.
by D. R. Fulkerson, and L. S. Shapley. 12 Jul 61, 14p P-2371

Descriptors: (*Electrical networks, Synthesis), (*Graphics, Electrical networks), Information theory, Topology, Hamiltonian, Costs.

A linear graph is k-arc-connected if it is necessary to remove at least k arcs in order to disconnect the graph. This paper solves the problem of determining the fewest number of arcs required in a k-arc-connected graph on n nodes by describing constructions that produce such graphs having kn/2 arcs (for kn even) or kn + 1/2 arcs (for kn odd). These results have application to the practical problem of synthesizing minimum cost, 'k-reliable' communication networks. (Author)

AD-636 038 **Field 9D**
CFSTI Prices: HC$3.60 MF$0.50
RAND Corp., Santa Monica, Calif.
THEORY AND APPLICATION OF THE NOTION OF COMPLEX SIGNAL.
by J. Ville. 1 Aug 58, 36p T-92
TT-66-61823

Descriptors: (*Information theory, *Wave functions), (*Signals, Information theory), Harmonic analysis, Frequency modulation, Complex variables.

Identifiers: Complex signals.

The present article is a contribution to the problem of the composite representation of a signal by a two-dimensional distribution of energy in a domain defined by two axes, the time axis and the frequency axis. The author proposes such a distribution, using operators analogous to those used in quantum mechanics. He thus obtains a definition of the instantaneous spectrum of a signal, and of the distribution of the energy corresponding to one frequency. By integration (with respect to time) of the instantaneous spectrum (which varies with time) the spectrum, in the usual sense of the word, is recovered. The author defines the instantaneous frequency of a signal in the same way, using the notion of a complex signal (obtained by the complex extension of the real signal when time is considered as a complex variable). These notions of instantaneous frequency and of the instantaneous spectrum are introduced to furnish a firm theoretical basis for studies of frequency modulation, of continuous harmonic analysis, of frequency compression, and, in a general way, of all the problems for which classical harmonic analysis furnishes a description which departs too far from physical reality. (Author)

AD-635 693 **See Field 5J**

AD-635 941 **See Field 12A**

AD-636 143 **See Field 17B**

AD-636 266 **See Field 17B**

9E. SUBSYSTEMS

AD-476 954 **Field 9E**
CFSTI Prices: HC$6.00 MF$0.50
Lincoln Lab., Mass, Inst. of Tech., Lexington.
DESIGN OF A TWELVE-HORN MONOPULSE FEED.
by Leon J. Ricardi, and Leon Niro. 24 Mar 61, 20p 315G-0002
Contract AF 19 (604)-7400

Descriptors: (*Antenna feeds, *Information theory), Antenna lobes, Tracking, Sensitivity, Errors, Antenna arrays, Masers, Horn antennas, Antenna radiation patterns, Parabolic antennas, Comparators.

In this paper, there is presented a well-known method of analysis as a means of comparing the theoretical advantages of the twelve-horn feed over the four-horn feed. A practical application of this theory with regard to the design of a Cassegrainian feed system is presented together with an alternate arrangement which provides simultaneously sequential lobing type tracking signals and a communication channel. (Author)

AD-476 983 **Field 9E**
CFSTI Prices: HC$3.00 MF$0.75
Lincoln Lab., Mass. Inst. of Tech., Lexington.
NOISE AND LOW-FREQUENCY AMPLIFIERS.
by M. Adler. 21 Dec 65, 61p Technical note TN-1965-52
Contracts AF 19 (628)-5167, ARPA Order-512
ESD-TDR-65-588

Descriptors: (*Transistor amplifiers, Noise (Radio)), (*Parametric amplifiers, Noise (Radio)), Analysis, Extremely low frequency, Superlow frequency, Electrical impedance, Theory, Varactor diodes, Impedance matching.

This paper is a study of low-noise amplification in the near direct current frequency range. The paper is a survey of the problem and no 'ultimate amplifier' is presented in conclusion. The purpose of this paper is to analyze the problem and to present conclusions as to best class of amplifiers to use in this frequency range. Two classes of amplifiers are considered. The 'chopper' amplifier and the semiconductor diode parametric amplifier. It is concluded that the semiconductor diode parametric amplifier is inherently the lower noise device of the two. There are no intrinsic noise sources in this amplifier and noise arises mainly from parasitic effects which theoretically can be made arbitrarily small. The use of this type of amplifier at low frequencies marks a new and successful application of a device usually associated with microwave frequencies. The first section of the paper is a critique of the various figures of merit used in specifying noise performance. The significance and proper use of the noise figure is discussed. The section on the 'chopper' amplifier includes analysis involving both the junction transistor and the field effect transistor. The conclusions are that the best overall performance of the chopper amplifier results when the junction transistor is used with a low impedance source. (Author)

AD-477 032 **Field 9E, 18H**
CFSTI Prices: HC$6.00 MF$1.25
Nortronics, Newbury Park, Calif. Applied Research Dept.
STUDY OF TRANSIENT RADIATION EFFECTS ON MICROELECTRONICS. VOLUME I: INTRODUCTION, EXPERIMENTAL STUDY, DIGITAL LOGIC GATE STUDY.
Final technical rept., Jan-Jul 65.
by James P. Raymond, Edward J. Steele, Elliott G. Lawrence, and William W. Chang. Dec 65, 219p
NARD-61-1OR-Vol-1
Contract AF 30 (602)-3589
Proj. AF-5710
RADC-TR-65-385-Vol-1
See also AD-477 033.

Descriptors: (*Microminiaturization (Electronics), Radiation damage), (*Radiation damage, Microminiaturization (Electronics)), (*Gates, Circuits), Failure (Electronics), Relaxation oscillators, Transistor amplifiers, Neutron flux, Voltage, Degradation, Vulnerability, Oxides.

For abstract, see T 66 17.

AD-477 033 **Field 9E, 18H**
CFSTI Prices: HC$5.00 MF$1.00
Nortronics, Newbury Park, Calif. Applied Research Dept.
STUDY OF TRANSIENT RADIATION EFFECTS ON MICROELECTRONICS. VOLUME II: FLIP-FLOP STUDY, AMPLIFIER STUDY, SUPPLEMENTARY CIRCUIT INVESTIGATION, CONCLUSIONS AND RECOMMENDATIONS.
Final rept., Jan-Jul 65.
by James P. Raymond, Edward J. Steele, Elliott G. Lawrence, and William W. Chang. Dec 65, 186p
NARD-65-1OR-Vol-2
Contract AF 30 (602)-3589
Proj. AF-5710
RADC-TR-65-385-Vol-2
See also AD-477 032.

Descriptors: (*Microminiaturization (Electronics), Radiation damage), (*Radiation damage, Microminiaturization (Electronics)), (*Relaxation oscillators, Radiation damage), Vulnerability, Degradation, Transistor amplifiers, Oxides, Failure (Electronics), Gates (Circuits).

AD-635 601 **Field 9E, 14D**
CFSTI Prices: HC$1.00 MF$0.50
Navy Electronics Lab., San Diego, Calif.
MULTISERVICE ELECTRONIC EQUIPMENT: A FEASIBILITY STUDY.
Research and development rept., Oct 65-Jan 66.
by B. R. Hatcher, and T. H. Hamm. 28 Apr 66, 22p NEL-1376
Proj. SF-013-14-04
Task 5788

Descriptors: (*Electronic equipment, Naval equipment), Airborne, Shipborne, Reliability (Electronics), Military requirements, Feasibility studies, Environmental tests, Modules (Electronic), Specifications, Packaging, Installation.

Operational requirements, environmental conditions, and specifications are compared for shipboard and airborne electronic equipment. Airborne equipment is tested to shipboard specifications, and vice versa. Preparation of common specifications is found feasible. Special mounting and packaging are indicated as the solutions to requirements not shared. (Author)

AD-635 627 **Field 9E**
CFSTI Prices: HC$1.00 MF$0.50
Centre de Physique Electronique et Corpusculaire, Orsay (France).
HALF MILLIMETER 'BACKWARD WAVE OSCILLATOR'.
Technical progress rept. no. 4, 1 Jan-31 Mar 66.
by Yeou Ta. Apr 66, 25p W.R.-1561
Contract AF 61 (052)-814
RADC-TR-66-450
See also AD-624 695.

Descriptors: (*Backward-wave oscillators, Millimeter waves), Backward-wave tubes, Bandwidth, Electron guns, Delay lines, Radiofrequency power, Electron beams, Cathodes (Electron tube).

The objective of the work was to construct a half-millimeter 'backward-wave' oscillator, with a power level in the range of half a watt. An electron gun, with a beam of about 0.07 millimeter in diameter, was designed and tested. A new type of increased reserve cathode gave encouraging results but should be verified over the high density range.

AD-635 852 **Field 9E**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
CERTAIN QUESTIONS OF THE THEORY OF DETECTION OF SINGLE PULSES.

by V. F. Nesteruk, and N. N. Porfireva. 14 Jan 66, 18p FTD-MT-65-62
TT-66-61799
Edited machine trans. of Korablestroitelnyi Institut, Leningrad. Trudy (USSR) v36 p121-33 1962.

Descriptors: (*Information theory, Demodulation), (*Electromagnetic pulses, Demodulation), Signals, USSR.

Four types of signal shapes are considered: (1) signals known exactly in interval of time T (simple synchronous detection); (2) signals, whose moment of appearance is known exactly, but their shape is random (complex synchronous detection); (3) signals with random shape and moment of appearance in interval T (complex asynchronous detection); (4) signals of known shape and random moment of appearance (simple asynchronous detection).

AD-635 858 **Field 9E, 13H, 11C**
CFSTI Prices: HC$2.00 MF$0.50
Pacific Missile Range, Point Mugu, Calif.
USE OF TEFLON TO REDUCE CORROSIVE EFFECTS ON SHIPBOARD ANTENNAS.
Technical memo.
by L. C. Read. 14 Mar 66, 36p PMR-TM-66-1
Proj. PMR/TS-J-O-5409201
Document contains color; reproduction in B/W only.

Descriptors: (*Ship antennas, Corrosion inhibition), (*Plastic coatings, Ship antennas), (*Halocarbon plastics, *Corrosion inhibition), Corrosive gases, Maintenance, Reliability (Electronics), Costs.

A coating material containing Teflon was used to repaint shipboard antennas undergoing maintenance or rehabilitation. The purpose of the project was to eliminate or reduce the corrosive effects of stack effluent, a major cause of the corrosion which results in antenna deterioration and failure. The corrosion problems connected with shipboard antenna maintenance are analyzed and illustrated. Current antenna procedures are described and their costs analyzed in terms of repeated antenna rehabilitation and reliability. The results of the project using the coating material containing Teflon are described and illustrated together with an analysis of relative cost and reliability. (Author)

AD-635 875 **Field 9E**
CFSTI Prices: HC$1.00 MF$0.50
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
TRANSFORMATIONS APPLIED TO THE POSITIVE REAL AND BIQUADRATIC IMMITTANCE FUNCTION.
Physical and mathematical sciences research papers.
by Kurt H. Haase. May 66, 22p AFCRL-PMSRP-228, AFCRL-66-326
Proj. AF-5628
Task 562806
Prepared for presentation at Midwest Symposium on Circuit Theory (9th), Oklahoma State Univ., Stillwater 9-10 May 66.

Descriptors: (*Circuits, Synthesis), (*Admittance, Electrical impedance), Functions, Frequency, Transformations, Numerical analysis.

Positive real and biquadratic immitance functions F (s) are realized in three groups each consisting of two times six equivalent circuits. The first group is obtained by interchanging three frequency functions implied in F (s). The second and third group is obtained by applying two proper frequency transformations keeping F (s) invariant. (Author)

AD-636 045 **Field 9E**
CFSTI Prices: HC$4.00 MF$0.75
Navy Underwater Sound Lab., New London, Conn.
THE HORIZONTAL MONOPOLE WITH FEED POINT AT GROUND LEVEL OVER A FINITELY CONDUCTING GROUND.
Research rept.
by Dennis E. Fessenden. 24 Jun 66, 102p USL-758
Proj. SS-269-000-11235

Descriptors: (*Omnidirectional antennas, Antenna configuration), Performance (Engineering), Electrical impedance, Gain, Antenna radiation patterns, Electric fields, Field theory, Partial differential equations, Transmission lines.

Identifiers: Monopole antennas.

The horizontal dipole or monopole at or near the surface of the ground has received extensive treatment in recent years; however, one of the disadvantages of this type of antenna is its bidirectional antenna pattern. One way of overcoming this disadvantage is to raise the monopole slightly above ground while keeping the feed point at ground level. Expressions are developed for the input impedance, electric field vectors, patterns, and power gain of this type of antenna based on the assumptions: (1) the displacement currents in the homogeneous ground are negligible compared to the conduction currents; (2) the horizontal portion of the antenna is much longer than the vertical portion (the practical case for low profile antennas); and (3)the product of the vertical height and free-space phase constant is less than 0.1. A comparison of experimental and theoretical data indicates that the actual antenna is electrically longer than predicted by theory. This may possibly be taken into account by increasing the physical length of the antenna by an empirical correction factor of 4 to 6 percent in the theoretical calculations. (Author)

AD-636 051 **Field 9E**
CFSTI Prices: HC$4.00 MF$1.00
United-Carr, Inc., Cambridge, Mass. Exploratory Development Lab.
MINIATURE PRECISION COAXIAL CABLE ASSEMBLIES.
Final rept., 15 Jun 63-30 Jul 65.
by David J. Addis, and Malor Wright. Jul 66, 135p
Rept. no. 5001-F
Contract DA-36-039-AMC-02371 (E)
Proj. DA-1P6-22001-A-057-04
ECOM-02371-F

Descriptors: (*Coaxial cables, Miniature electronic equipment), Electrical impedance, Broadband, Standing wave ratios, Microwave equipment, Electromagnetic shielding, Transmission lines, Plating.

A miniature, flexible, precision coaxial cable, of 50 ohms characteristic impedance, was developed for broadband applications at frequencies up to 10 GC. Intended applications for the cable are in beacon and missile equipment and in microminiaturized ground communication and radar equipment. Mechanical and electrical design of the cable, which features a plated, corrugated outer conductor, was completed to contract specifications. A pilot plant was designed to produce the cable at the rate of 5 ft./hour. The development program was concluded with extended environmental and electrical testing of prototype cable. (Author)

AD-636 055 **Field 9E, 17B**
CFSTI Prices: HC$2.00 MF$0.50
Lenkurt Electric Co., Inc., San Carlos, Calif.
NETWORK, HYBRID BRANCHING TA-618 (XW-1)/FCC-17 AND TA-640 (XW-1)/FCC-17 THROUGH TA-644 (XW-1)/FCC-17 (HYBRID BRANCHING PANEL).
Phase B (Final).
by Forrest N. Easley, and T. R. Holmes. 20 May 66, 39p
Contract AF 30 (635)-11188
RADC-TDR-64-372-Vol-2

Descriptors: (*Multiplex, Networks), (*Networks, Modules (Electronic)), Radio equipment, Reliability (Electronics), Failure (Electronics), Electric filters, Radio communication systems.

Identifiers: AN/FCC-17.

This report contains a summary of the development of two Hybrid Branching Networks TA-618 (XW-1)/FCC-17 and TA-640 (XW-1)/FCC-17 through TA-644 (XW-1)/FCC-17 fabricated under the provisions of Contract AF 30 (635)-11188, Modification 12. The hybrid branching networks were designed and developed for insertion in a radio baseband to allow supergroups or groups of vf channels to be dropped from the baseband and be routed to multiplex terminal equipment. The remainder of the vf channels remain in the baseband as through channels. Any channels dropped may be replaced by new channels covering the same frequency range. Evaluation of the two hybrid branching panels was accomplished to determine compliance with design requirements set forth in Lenkurt Electric Co., Inc. equipment specification 805-02738, and to evaluate equipment performance. The evaluation tests indicated the equipment is highly reliable and is entirely within the specifications set forth. However, when the equipment was stored for eight hours at -62C, the molded cases encasing the input and output transformers cracked. Further tests revealed no resultant decrease in performance quality. (Author)

AD-636 112 **Field 9E**
CFSTI Prices: HC$6.60 MF$0.75
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
CORRELATION OF RADIATION PATTERNS TO CIRCULARLY SYMMETRIC APERTURE DISTRIBUTIONS.
by Dave Johnston Jr. May 49, 63p Bumblebee-103
Contract NOrd-7386

Descriptors: (*Antenna apertures, *Antenna radiation patterns), Field theory, Partial differential equations, Integration, Distribution.

An analytical method for determining the amplitude distribution of electric and magnetic field vectors over a finite aperture is developed. The method is based on direct integration of the Maxwell field equations and the fact that uniform phase amplitude distributions of plane polarized electric field vectors and their corresponding aperture distributions may be added scalarly at each point in space and over the aperture. It is rigorous and requires no assumptions regarding aperture limits. The only restriction placed on the method from a practical point of view is that the postulated distant field pattern for which the source distribution is sought, must be of such a nature that it may be set up by circularly symmetric, plane polarized waves over the illuminated aperture. A relatively simple means of checking a postulated pattern to determine if it meets this requirement is also developed.

AD-636 207 **Field 9E, 17B**
CFSTI Prices: HC$5.00 MF$1.00
Lenkurt Electric Co., Inc., San Carlos, Calif.
AN/FCC-17 TYPE LOWER SIDEBAND MULTIPLEXER EQUIPMENT (EXPERIMENTAL).
Technical rept., phase A.
by Forrest N. Easley, C. Dean Charrier, and Stanley Lee. 20 May 66, 170p
Contract AF 30 (635)-11188
RADC-TDR-66-9
See also AD-625 549.

Descriptors: (*Multiplex, *Communication equipment), Sidebands, Telephone communication systems, Modules (Electronic), Electric terminals, Band-pass filters, Frequency dividers, Performance (Engineering).

Identifiers: AN/FCC-17.

The report contains a summary of the design and evaluation efforts and a detailed theoretical discussion of the lower sideband AN/FCC-17 channel multiplexing and associated equipment. This equipment was designed for use with existing AN/FCC-17 or commercial multiplex systems, thereby increasing system flexibility, permiting end-to-end or group-interconnect operation with other multiplexer sets conforming to channel, group, and supergroup recommendations of CCITT. The equipment was designed to logically integrate with existing AN/FCC-17 equipment without modification. External envelope delay is provided as an option only when phase equalization is required. The new equipment items were designed to meet AN/FCC-17 idle noise, loaded noise, and channel harmonic distortion characteristics of MIL-M-27741. Only 2 major design problems were encountered and were related to the channel carrier generator 4-kc amplifier combining network. The first problem was in obtaining adequate paralleling action due to excessive coil resistance. The other problem was concerned with insufficient temperature compensation that caused variation in signal levels of frequencies between 64 and 108 kc at various ambient temperatures. (Author)

AD-636 215 **Field 9E, 20E, 20I**
CFSTI Prices: HC$4.00 MF$0.75
Utah Univ., Salt Lake City. Microwave Device and Physical Electronics Lab.
MICROWAVE DEVICE AND PHYSICAL ELECTRONICS LABORATORY CONSOLIDATED QUARTERLY REPORT FOR THE PERIOD, OCTOBER 1, 1965 TO DECEMBER 31, 1965.
Technical rept.
31 Dec 65, 110p TR-MDL-Q15
Contracts Nonr-1288 (05), AF 33 (657)-8677
Research supported in part by Dept of Army, Contracts DA-28-043-AMC-01279 (E), DA-36-039-AMC-02372 (E), Grants NSF-GK-29, and Natl. Science Foundation, Grant NSF-GK-717. See also AD-612 954.

Descriptors: (*Electronics, Electromagnetic waves), (*Electromagnetic waves, *Frequency), (*Lasers, Electronics), (*Plasma physics, Electronics), (*Electron beams, Microwave equipment), Traveling-wave tubes, Backward-wave oscillators, Beam power tubes, Tunneling (Electronics), Masers, Millimeter waves, Scattering, Magnetic fields, Coupling circuits, Superconductivity.

Table of Contents: Electron beam studies, dielectric slow-wave circuits, rotating beam devices, multiple-beam interactions, magneto-electric beam compression, a two-millimeter backward-wave oscillator, microwave power converter; Quantum studies, tunneling studies, millimeter wave masers, gas laser studies, raman scattering; Plasma studies, plasma generation and measurements, plasma properties in a magnetic field, plasma for a coupling medium, Superconductivity.

AD-636 216 **Field 9E, 20E, 20I**
CFSTI Prices: HC$3.00 MF$0.75
Utah Univ., Salt Lake City. Microwave Device and Physical Electronics Lab.
MICROWAVE DEVICE AND PHYSICAL ELECTRONICS LABORATORY CONSOLIDATED QUARTERLY REPORT FOR THE PERIOD, JANUARY 1, 1966 TO MARCH 31, 1966.
Technical rept.
31 Mar 66, 69p TR-MDL-Q16
Contracts Nonr-1288 (05), DA-28-043-AMC-01279 (E)
Research supported in part by National Science Foundation, Grants NSF-GK-29, NSF-GK-717. See also AD-636 215.

Descriptors: (*Electronics, Electromagnetic waves), (*Electromagnetic waves, *Frequency), (*Lasers, Electronics), (*Plasma physics, Electronics), (*Electron beams, Microwave equipment), Traveling-wave tubes, Backward-wave oscillators, Beam power tubes, Tunneling (Electronics), Masers, Millimeter waves, Scattering, Tuning devices, Magnetic fields, Superconductivity, Coupling circuits.

Table of Contents: Electron beam studies, dielectric slow-wave circuits, rotating beam devices, multiple-beam interactions, magneto-electric beam compression, a two-millimeter backward-wave oscillator, microwave power converter; Quantum studies, tunneling studies, millimeter wave masers, gas laser studies, raman scattering, optical frequency tuning by parametric operation; Plasma studies, plasma generation and measurements, plasma properties in a magnetic field, plasma for a coupling medium, superconductivity.

AD-636 261 **Field 9E, 9A**
CFSTI Prices: HC$2.00 MF$0.50
Michigan Univ., Ann Arbor. Electron Physics Lab.
SEMICONDUCTOR AND O-TYPE AMPLIFIER INVESTIGATIONS.
Quarterly progress rept. no. 6, 1 Dec 65-1 Mar 66.
by J. E. Rowe, Jun 66, 50p
Contract AF 30 (602)-3569
Projs. AF-5573, MU-06847
Task 557303
RADC-TR-66-288
See also AD-630 474.

Descriptors: (*Traveling-wave tubes, Amplifiers), (*Semiconductor devices, Amplifiers), (*Microwave amplifiers, Traveling-wave tubes), Magnetrons, Diodes (Semiconductor), Electron guns, Noise (Radio), Gallium alloys, Arsenic alloys, Ultrahigh frequency.

Identifiers: Gunn effect.

Electron-beam profiles are presented for nonlinear traveling-wave amplifiers in which the beam is focused with the Brillouin field and for devices with B > B sub Br. The Boltzmann-Vlasov equation is used to analyze the interaction between a beam and a slow-wave circuit, and a new normalization integrate in the sense of making it simpler to obtain convergent numerical solutions. Experimental results are presented on microperveance-one and microperveance-two guns and the design of the r-f beam analyzer equipment is discussed. The digital computer program for the analysis of magnetron injection guns has been improved with regard to stability of the solutions and accuracy. Experimental tests on the magnetron injection gun UHF TWA are carried out with emphasis on the optimization of the magnetic field distribution in the gun region in order to minimize the amplifier noise figure. A minimum noise figure of 15.3 db was obtained for a beam current of 410 ma and a beam power of approximately 1400 watts. Processes are described for applying ohmic contacts to n-type gallium arsenide with resistivities in the range of 0.22 to 10 ohm-cm. Principal effort has been on sintered contacts which are suitable for low duty-cycle operation of Gunn diodes.

N66-15392 **Field 9E**
CFSTI Prices: HC$1.00 MF$0.50
Georgia Inst. of Tech., Atlanta.
THE EFFECT OF LOAD CONDUCTANCE ON THE SELECTIVITY OF NOTCH FILTERS.
by K. L. Su. 1965, 11p
NGR-11-002-020
NASA-CR-69341

Descriptors: *Notch, *Electronic filter, *RC network.

For abstract, see T 66 17.

N66-18110 **Field 9E**
CFSTI Prices: HC$1.00 MF$0.50
Osterreichische Studiengesellschaft Fuer Atomenergie G.M.B.H., Seibersdorf.
UNIVIBRATOR AS A TIME BASE ELEMENT IN A MEDIUM FAST COINCIDENCE CIRCUIT.
by H. Halling, and F. May. 1965, 22p SGAE-E-5/1965

Descriptors: *Electronic equipment, *Time delay, *Timing apparatus, *Transistor circuit.

N66-18483 **Field 9E**
CFSTI Prices: HC$2.00 MF$0.50
Research Labs. Div., Bendix Corp., Southfield, Mich.
DESIGN, FABRICATION AND TEST OF A FLUERIC SERVOVALVE.
Quarterly rept. 28 Sep-28 Dec 65.
by C. E. Vos. 1965, 32p BRLD-3281
Contract NAS3-7980
NASA-CR-54901

Descriptors: *Feedback control system, *Servomechanism, *Valve, *Pneumatic control.

PB-170 378 **Field 9E, 13I**
CFSTI Price: HC$4.00
Institute for Cooperative Research, Johns Hopkins Univ., Baltimore, Md.
EXTENSION OF FREQUENCY METHOD OF ANALYZING RELAY-OPERATED SERVOMECHANISMS. SECTIONS I AND II.
FINAL REPT.
by John M. Kopper, and Henry S. McDonald. 30 Jun 55, 97p
Contract DA-36-034-ORD-1273RD
Proj. DA-5R13-01-004
AD-112 448

Descriptors: (*Servomechanisms, Mathematical analysis), (*Relays, Servomechanisms), Control systems, Graphics, Circuits, Nonlinear differential equations, Feedback, Integral transforms, Integral equations, Fourier analysis, Series, Stabilization.

The purpose of the project was to extend the frequency method of analyzing relay-operated servomechanisms and to provide for the discontinuous type of control system analytical procedures that would further the understanding of system performance and thereby facilitate design work. In these studies the parameters of dead-zone width, hysteresis-zone width, and time delay are related to the design desiderata of minimum error, maximum speed of response, and stability of operation. Graphical methods are given for determination of the response to step and ramp inputs, and for tests for limit cycles. A set of design curves is developed for compensation by R-C phase-lead networks. The works of many different authors are compared and related by a uniform notation. The relay servo problem is stated in the form of a nonlinear difference-differential equation, and solutions are given in the time domain and phase plane. These solutions are obtained by Laplace transform methods, the integral equation approach, Fourier series methods, and methods of equivalent linearization, including the describing-function technique. The design of stabilizing networks and the general theory of stabilization are discussed. (Author)

PB-170 385 **Field 9E, 17G, 16D**
CFSTI Price: HC$3.00
Johns Hopkins Univ., Silver Spring Md. Applied Physics Lab.
TRANSISTORIZED OPERATIONAL DEMODULATOR DRIVER. DESIGN STUDY AND EVALUATION.
Master's thesis.
by Richard W. Phelps. Mar 60, 109p Bumblebee rept. no. 292
Contract NOrd-7386
AD-239 779

Descriptors: (*Circuits, Feedback), (*Automatic pilots, Circuits), Transistors, Transistor amplifiers, Feedback amplifiers, Demodulators, Guided missile components, Design.

Identifiers: Bumblebee project.

Many existing guided missiles include an autopilot whose function is to so convert steering command intelligence from a source external to the autopilot into motions of the missile's control surfaces that the resultant missile maneuver satisfies the command. An autopilot generally employs the use of

feedback from the control surfaces, through the aerodynamics, as sensed by such end-instruments as accelerometers and rate gyros, and into suitable circuitry so that the experienced missile motion might be summed against that called for. This paper is concerned with a specific design for a portion of the circuitry interposed between the sensing instruments and the autopilot over-all feedback summation point.

AD-267 163 **See Field 20N**

AD-635 831 **See Field 9A**

AD-635 917 **See Field 9A**

AD-635 975 **See Field 17B**

AD-636 037 **See Field 9D**

AD-636 282 **See Field 17B**

9F. TELEMETRY

AD-635 857 **Field 9F**
CFSTI Prices: HC$4.00 MF$0.75
Range Commanders Council, White Sands Missile Range, N. Mex. Telemetry Working Group.
TELEMETRY STANDARDS (REVISED MARCH 1966).
Apr 66, 102p
RCC-106-66
See also AD-674 530.

Descriptors: (*Telemeter systems, Standards), Guided missile ranges, Radio frequency, Multiplex, Pulse modulation, Modulation, Magnetic recording systems, Compatibility, Telemetering transmitters, Telemetering receivers.

It is the purpose of this revision to delineate the obtainable performance of modern telemetry systems within the limits of practical design and use. These standards, therefore, do not necessarily define the existing capability of any test range but, rather, constitute a guide for the implementation and orderly application of telemetry systems for both the ranges and range users within the limits of good design practice. The broader range of capabilities attainable under these standards requires more careful consideration of tradeoffs (e.g., frequency response versus accuracy) than heretofore. Guidance to the user in this consideration is provided in the appropriate appendices to these standards. These telemetry standards were established to further the compatibility of airborne transmitting equipment and ground receiving and data-handling equipment at the test ranges.

N66-12183 **Field 9F**
CFSTI Prices: HC$5.00 MF$1.00
Dalmo Victor Co., Belmont, Calif.
QUASI-ISOTROPIC SPACECRAFT ANTENNA SYSTEM.
Final rept.
by V. Galindo, K. A. Green, and J. R. Wood. 30 Jun 65, 176p R-2870-3582-B
Contract NAS7-100
NASA-CR-68124
Prepared in cooperation with Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

Descriptors: *Spacecraft communications system, *Telemetry, *Antenna array.

For abstract, see T 66 17.

N66-12186 **Field 9F**
CFSTI Prices: HC$1.00 MF$0.50
Pennsylvania State Univ., University Park. Systems and Controls Lab.
RESEARCH AND DEVELOPMENT OF ON BOARD CONTROL SYSTEMS AND ELEMENTS FOR AEROSPACE VEHICLES.
by J. C. Tamulis. Oct 65, 14p
Grant NGR-39-009-023
NASA-CR-68101

Descriptors: *Fluid mechanics, *Aerospace technology, *Dynamic control, *Space vehicle control.

N66-13159 **Field 9F**
CFSTI Prices: HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RELIABLE TIME MULTIPLEXING BY REPLACEMENT.
by J. R. Kinkel. 15 Nov 65, 27p JPL-TR-32-828
Contract NAS7-100
NASA-CR-68535

Descriptors: *Electromechanical device, *Multiplex transmission, *Magnetic switching, *Switching circuit, *Time division multiplex.

N66-13172 **Field 9F**
CFSTI Prices: HC$1.00 MF$0.50
Energy Systems, Inc., Palo Alto, Calif.
TRANSMITTERS, TELEVISION S-BAND SYSTEM.
Quarterly progress rept.
by D. Mamayek, and G. E. Tallmadge. 1 Oct 65, 21p
Contract NAS8-11990
NASA-CR-68506

Descriptors: *S-band, *Solid state, *Television transmission, *Circuit, *Electric equipment, *Radio transmitter.

N66-14629 **Field 9F**
CFSTI Prices: HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DEMONSTRATION OF A QUANTILE SYSTEM FOR COMPRESSION OF DATA FROM DEEP SPACE PROBES.
by T. O. Anderson, I. Eisenberger, W. A. Lushbaugh, and E. C. Posner. 1 Dec 65, 29p JPL-TR-32-772
Contract NAS7-100
NASA-CR-68997

Descriptors: *Compression, *Data compressor, *Telemetry.

N66-18406 **Field 9F**
CFSTI Prices: HC$5.00 MF$1.50
Resdel Engineering Corp., Pasadena, Calif.
S-BAND ODOP TRANSPONDER.
Final rept.
by J. R. Pourtales. 1965, 276p REC-TR-15
Contract NAS8-11509
NASA-CR-70591

Descriptors: *Radio tracking, *Rocket booster, *Transponder.

N66-18415 **Field 9F**
CFSTI Prices: HC$3.00 MF$0.50
New Mexico State Univ., University Park. Physical Science Lab.
RADIATION TESTS FOR ORBITING ASTRONOMICAL OBSERVATORY.
Scientific rept no. 1.
by H. W. Haas, and D. G. Henry. May 62, 56p
Contract NAS5-1032
NASA-CR-70516

Descriptors: *Electronic equipment testing, *OAO, *Radar antenna.

AD-267 163 **See Field 20N**

10A. CONVERSION TECHNIQUES

AD-635 584 **Field 10A**
CFSTI Prices: HC$4.00 MF$0.75
Naval Research Lab., Washington, D. C.
DIRECT ENERGY CONVERSION LITERATURE ABSTRACTS.
Jun 66, 122p Rept. no. 11

Descriptors: (*Bibliographies, *Energy conversion), Abstracts, Thermoelectricity, Thermionic converters, Thermionic emission, Photoelectric effect, Magnetohydrodynamics, Electrochemistry, Nuclear reactors, Batteries + components.

A collection of references from various sources covering the current literature on thermoelectricity, thermionic emission, photoelectric processes, magnetohydrodynamics, electrochemical processes, energy storage, and energy sources. (Author)

N66-12189 **Field 10A**
CFSTI Prices: HC$1.00 MF$0.50
Lockheed Missiles and Space Co., Sunnyvale, Calif.
STUDY OF DRIFT-FIELD SOLAR CELLS DAMAGED BY LOW-ENERGY PROTONS.
Progress rept. 10 Sep-15 Oct 65.
by R. A. Breuch, D. L. Crowther, and J. DePangher. 1965, 23p
Contract NAS5-9627
NASA-CR-68159

Descriptors: *Solar cell, *Data analysis, *Irradiation, *Proton damage.

For abstract, see T 66 17.

N66-12193 **Field 10A**
CFSTI Prices: HC$1.00 MF$0.50
Lockheed Missiles and Space Co., Sunnyvale, Calif.
STUDY OF DRIFT-FIELD SOLAR CELLS DAMAGED BY LOW-ENERGY PROTONS.
Progress rept. 15 Jun - 10 Aug 65.
by J. DePangher. 1965, 7p
Contract NAS5-9627
NASA-CR-68158

Descriptors: *Irradiation, *Laboratory apparatus, *Proton damage, *Solar cell.

N66-12196 **Field 10A**
CFSTI Prices: HC$4.00 MF$0.75
Allis-Chalmers Mfg. Co., Milwaukee, Wis. Research Div.
A DIGITAL PROGRAM FOR DESIGNING MINIMUM WEIGHT FUEL CELL POWER SYSTEMS.
by R. R. Desai. Jun 65, 113p
Contract NAS8-5392
NASA-CR-68125

Descriptors: *IBM 704 computer, *Space vehicle, *Fortran, *Fuel cell, *Lightweight.

N66-13157 **Field 10A**
CFSTI Prices: HC$1.00 MF$0.50
General Electric Co., Schenectady, N. Y. Research and Development Center.
ELECTRODEPOSITED INORGANIC SEPARATORS.
Quarterly rept. no. 1, 15 Apr-15 Jul 65. 1965, 19p
Contract NAS5-9168
NASA-CR-68470

Descriptors: *Calcium compound, *Electrodeposition, *Magnesium compound, *Silver-cadmium battery, *Thermostability, *Thin film.

N66-14753 **Field 10A**
CFSTI Prices: HC$6.00 MF$1.50
TRW Equipment Labs., Cleveland, Ohio.
OPTIMIZATION STUDY OF HIGH POWER STATIC INVERTERS AND CONVERTERS.
Final rept.
by R. G. Klimo, E. L. Krejny, A. B. Larson, J. E.

Murray, and R. J. Resch. 14 Sep 64, 275p TRW-ER-6586
Contract NAS3-2785
NASA-CR-54186

Descriptors: *Performance characteristics, *Static inverter, *Optimization.

N66-14786 **Field 10A**
CFSTI Prices: HC$2.00 MF$0.50
Alfred Univ., N. Y.
FUEL CELL RESEARCH - AN INVESTIGATION OF NONSTEADY-STATE OPERATION.
Final rept., 1 Jun 63-1 Jun 65.
by T. J. Gray, R. B. Rozelle, A. A. Schneider, and M. L. Soeder. Dec 65, 36p
Grant NsG-384
NASA-CR-54768

Descriptors: *Electrode, *Pulsed generator, *Fuel cell, *Galvanomagnetism.

N66-15728 **Field 10A**
CFSTI Prices: HC$3.00 MF$0.75
Astro-Electronics Div., Radio Corp. of America, Princeton, N. J.
APPLICATION OF GALLIUM-ARSENIDE SOLAR CELLS TO SOLAR PROBE POWER SYSTEMS.
Final rept.
30 Sep 65, 88p AED-R-2817
Contract NAS2-2600
NASA-CR-69537

Descriptors: *Solar cell, *Temperature control, *Power supply, *Gallium arsenide.

N66-17250 **Field 10A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
CHARACTERISTICS OF THE SOLAR ARRAYS FOR THE ENERGETIC PARTICLE EXPLORERS.
by N. V. Mejia Jr, L. W. SliferJr, and R. M. Sullivan. Oct 65, 44p NASA-TM-X-55377, X-716-65-392

Descriptors: *Explorer satellite, *Power supply, *Solar cell.

N66-17253 **Field 10A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
THE ATMOSPHERE EXPLORER-B SOLAR ARRAY (AE-B).
by E. Moses. Oct 65, 21p NASA-TM-X-55380, X-716-65-401

Descriptors: *Charge, *Silver-zinc battery, *Solar cell, *Atmosphere, *Explorer satellite.

N66-17258 **Field 10A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
PRELIMINARY RESULTS OF THE EXPLORER XXVI SOLAR CELL EXPERIMENT.
by S. G. McCarron, and L. W. Slifer Jr. Oct 65, 35p NASA-TM-X-55385, X-716-65-410

Descriptors: *Explorer XXVI satellite, *Radiation resistance, *Solar cell.

N66-17326 **Field 10A**
CFSTI Prices: HC$6.00 MF$1.50
Pennsylvania Univ., Philadelphia. Power Information Center.
PROCEEDINGS OF THE FIFTH PHOTOVOLTAIC SPECIALISTS MEETING. VOLUME II-THIN FILM SOLAR CELLS AND RADIATION DAMAGE.
Jan 66, 290p PIC-SOL-209/6.1
Contract NASr-19
NASA-CR-70169

Descriptors: *Radiation effect, *Thin film, *Conference, *Solar cell.

N66-17472 **Field 10A**
CFSTI Prices: HC$7.00 MF$2.00
Thermo Electron Engineering Corp., Waltham, Mass.
THERMIONIC RESEARCH PROGRAM, VOLUME I.
Final rept.
by S. Kitrilakis, D. Lieb, F. Rufeh, L. Van Someren, and J. Weinstein. 2 Aug 65, 370p TE-7-66
Contract NAS7-100
NASA-CR-70467

Descriptors: *Test equipment, *Thermionic converter, *Energy converter.

N66-18325 **Field 10A**
CFSTI Prices: HC$5.00 MF$1.25
Boeing Co., Seattle, Wash.
FABRICATION FEASIBILITY STUDY OF A 20 WATT PER POUND SOLAR CELL ARRAY.
Final rept. 22 Feb-Dec 65.
by W. I. Ratcheson. 19 Nov 65, 181p D2-23942-5
Contract NAS7-100
NASA-CR-70582

Descriptors: *Electric propulsion, *Photovoltaic cell, *Electric energy, *Solar cell.

N66-18407 **Field 10A**
CFSTI Prices: HC$4.00 MF$1.00
Heliotek Div., Textron Electronics, Inc., Sylmar, Calif.
DEVELOPMENT OF AN IMPROVED RADIATION RESISTANT SOLAR CELL.
Final rept.
by P. Berman, and W. Kiba. 10 Jan 65, 122p
Rept. no. 19
Contract NAS5-3558
NASA-CR-70587

Descriptors: *Drift, *Solar cell, *Radiation effect.

N66-18429 **Field 10A**
CFSTI Prices: HC$2.00 MF$0.50
Space Technology Labs., Inc., Redondo Beach, Calif.
EFFECTS OF LOW ENERGY PROTONS AND HIGH ENERGY ELECTRONS ON SILICON.
by J. R. Carter, and R. G. Downing. Mar 66, 44p
Contract NAS5-3805
NASA-CR-404

Descriptors: *Corpuscular radiation, *Electron radiation, *High energy electron, *Proton irradiation, *Radiation effect, *Silicon solar cell.

N66-18433 **Field 10A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
THEORETICAL BACKGROUND FOR THERMIONIC CONVERSION INCLUDING SPACE-CHARGE THEORY, SCHOTTKY THEORY, AND THE ISOTHERMAL DIODE SHEATH THEORY.
by R. Breitwieser, and W. B. Nottingham. Mar 66, 40p NASA-TN-D-3324

Descriptors: *Isothermal process, *Performance characteristics, *Plasma sheath, *Space charge, *Thermionic conversion system.

AD-636 094 **See Field 13I**

AD-636 257 **See Field 20L**

10B. POWER SOURCES

AD-465 284 **Field 10B, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Battelle Memorial Inst., Columbus, Ohio.
SURVEY OF ALTERNATING-CURRENT POWER SUPPLIES FOR WELDING.
by H. E. Pattee. 25 Nov 64, 34p
Contract DA-01-021-AMC-203 (Z)
RSIC-329
Supported in part by National Aeronautics and Space Admin. Geo. C. Marshall Space Flight Center, Huntsville, Ala.

Descriptors: (*Power supplies, Arc welding), (*Arc welding, power supplies), Aluminum alloys, Alternating current, Frequency, Frequency shift, Voltage, Electric arcs, Frequency converters, Cleaning, Polarization, Electrodes, Gases, Tungsten, Generators, Saturable reactors, Semiconductor devices, Arc welds, Crystal rectifiers, Silicon, Electronic switches.

This report presents the results of a survey made to determine the availability of an unusual alternating-current power supply for welding. Studies which are currently under way require a power unit with variable frequency output conditions and an open-circuit voltage which is double the usual amount. Equipment meeting all of the requirements is not available commercially; however, power units of the type desired are in the design stages and some prototype construction has been undertaken. Then design of a variable-frequency power supply with the specified output-voltage characteristics appears to be technically feasible. A number of prototype power supplies with output characteristics which can be controlled or programmed to suit the welding application have been constructed. Considerable research has been conducted with such equipment to study the arc characteristics and to relate weld properties to the shape of the output-current waveform. The results of such investigations are reported also. (Author)

AD-635 676 **Field 10B**
CFSTI Prices: HC$1.00 MF$0.50
Westinghouse Electric Corp., Lima, Ohio. Aerospace Electrical Div.
100 WATT THERMOELECTRIC POWER SYSTEM FOR BUOY APPLICATIONS.
Monthly progress rept. no. 24, 11 May-11 Jun 66.
by Dale A. Naumer. 11 Jun 66, 2p
Contract N600 (61533)61992
See also AD-629 006.

Descriptors: (*Thermoelectricity, Buoys), (*Buoys, Power supplies), Battery chargers, Oceanographic equipment, Generators, Electric power production, Life expectancy, Performance (Engineering).

The first thermoelectric generator system for use as a battery charger in an oceanographic buoy has completed the 500 hour test. All of the test objectives of simulated hot day and cold day operation were achieved.

AD-635 704 **Field 10B**
CFSTI Prices: HC$1.00 MF$0.50
Minnesota Mining and Mfg. Co., St. Paul. Thermoelectric Products.
300 WATT PORTABLE THERMOELECTRIC GENERATOR.
Monthly progress rept. no. 16, 7 Jul 66.
by T. L. Nystrom. 7 Jul 66, 6p
Contract N600 (61533)62758
See also AD-634 103.

Descriptors: (*Thermoelectricity, Power supplies), (*Generators, Thermoelectricity), (*Electric power production, Thermoelectricity), Performance (Engineering), Maintenance, Portable, Tests.

The two final Power Systems were assembled, tested, and delivered to the U. S. Navy Marine Engineering Laboratory at Annapolis, Maryland. The test results indicate that the major goals of this development program have been fulfilled. (Author)

AD-635 741 **Field 10B, 21B**
CFSTI Prices: HC$3.00 MF$0.75
Sheffield Univ. (England). Dept. of Fuel Technology and Chemical Engineering.
INTENTIONAL COMBUSTION OSCILLATIONS IN PROPULSION SYSTEMS.
Final scientific rept.
by J. Swithenbank. 25 Apr 66, 63p HIC-74
Grant AF-EOAR-23-65
Proj. AF-9711
Task 971101
AFOSR-66-1438

Descriptors: (*Magnetohydrodynamic generators, Combustion), (*Combustion, Oscillation), Electrical conductance, Power, Pressure, Combustion chambers, Mobile, Great Britain, Propulsion, Stability, Shock tubes.

The power density available from a magnetohydrodynamic (MHD) generator is a function of the plasma velocity and electrical conductivity (which shows an exponential dependence on temperature). An increase in velocity by expansion of the gas through a nozzle can reduce the temperature and consequently the power density. Modulation of these two parameters may be achieved by using combustion oscillations within a MHD generator. The periodic variations in velocity and temperature (hence conductivity) give a higher mean power density. Simple formulae are given by which the increase in power density is demonstrated for combustion oscillations having pressure amplitudes up to unity. Different types of generator are possible in which combustion oscillations provide the required modulation and these are discussed. In order to verify the theory an experimental rig was designed and constructed to provide the first order travelling tangential mode of combustion oscillation. The instrumentation was developed to cope with the extreme conditions arising in the combustion chamber. Results so far indicate the oscillatory nature of the conductivity. (Author)

AD-635 759 **Field 10B**
CFSTI Prices: HC$1.00 MF$0.50
Naval Research Lab., Washington, D. C.
AN/APX-72 POWER-CONVERTER.
Memo rept.
by W. Beiles. Jun 66, 11p NRL-MR-1705
Proj. SF001-10-01-6220

Descriptors: (*Power supplies, Direct current), Alternating current, Power transformers, Full-wave rectifiers, Portable, Shipborne, Transponders.

Identifiers: AN/APX-72, Power converters.

This report describes the development of an AC to DC converter from 115VAC to 28 VDC using 60 or 400 cycles. A working unit will be used with the APX-72 Transponder and associated equipment aboard ship permitting operation from the ship's AC power source. It is desired that the equipment be as compact as possible in order to ease the burden of carrying. (Author)

AD-635 851 **Field 10B**
CFSTI Prices: HC$1.00 MF$0.50
Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
MEASUREMENT TECHNIQUES FOR SILICON SOLAR CELLS.
by D. F. Prystaloski. 26 May 66, 18p AFAPL-CONF-66-4
Proj. AF-817301
Task 817301-19
Prepared for presentation at the Annual Power Sources Conference (20th), Atlantic City, New Jersey, 24-26 May 1966.

Descriptors: (*Solar cells, Measurement), Silicon, Effectiveness, Electric power production, Simulators, Solar radiation, Correlation techniques, Carbon, Xenon, Tungsten, Filaments, Lighting equipment, Energy, Intensity.

The problem of correlating the measured radiation energy intensity of several flux detectors under the carbon-arc, xenon, and tungsten-filament lamps as solar simulators is complex. Associated factors of basic importance in understanding this correlation are spectral continuity, stability, spectral distribution, and uniformity of intensity of the artificial light sources. A procedure for establishing accurate, incident radiation flux or input energy under the mentioned light sources is essential to insure agreement in solar-cell efficiency measurements. The use of this correlation is illustrated in the reporting of the performance characteristics of the Westinghouse dendritic, silicon, standard, and drift-field, solar-cell arrays. (Author)

AD-636 164 **Field 10B**
CFSTI Prices: HC$3.00 MF$0.75
Navy Marine Engineering Lab., Annapolis, Md.
OPERATIONAL STUDIES OF A SOLIUM AMALGAM-OXYGEN FUEL CELL PILOT PLANT.
Research and development rept.
by J. A. Woerner. Jul 66, 59p MEL-7/65
Contract NObs-78461

Descriptors: (*Fuel cells, Performance (Engineering)), Mercury alloys, Sodium, Oxygen, Power supplies, Submarines.

Operational studies have been conducted on a sodium amalgam-oxygen fuel cell pilot plant in various configurations for a total of 400 hours. The pilot plant was designed by the M. W. Kellogg Company for a five-module rated power level of 5.9 kilowatts and a maximum overload capacity of 15.9 kilowatts corresponding to electrode current densities of 70 and 285 amp per sq ft, respectively. A maximum power output of 8.7 kilowatts was obtained with 5 modules at a current density of 150 amp per sq ft. A load-bank-capacity-limited output of 8.48 KW was obtained with 4 modules in series. Continual regeneration of a flowing amalgam stream by manually controlled mechanical extrusion of solid sodium was successfully accomplished over a normal 8-hour day of test operation. Pilot plant tests were terminated after 400 hours total operation because of reduced Navy interest in sodium amalgam fuel cells. Electrochemical performance of the electrodes was considered favorable. Further engineering development work on sodium amalgam regeneration and distribution is necessary to achieve an overall power plant system which will provide reasonably trouble-free operation over the life of the fuel cells. (Author)

AD-636 249 **Field 10B, 9A, 20L**
CFSTI Prices: HC$4.00 MF$0.75
Delco Radio Div., General Motors Corp., Kokomo, Ind.
STUDY OF GERMANIUM DEVICES FOR USE IN A THERMO-PHOTOVOLTAIC CONVERTER.
Final rept. no. 3, 1 Jul 65-1 Apr 66.
by D. P. Crouch, and R. W. Beck. Jul 66, 103p
Contract DA-28-043-AMC-01420 (E)
Proj. DA-1C6-22001-A-053
Task 01
ECOM-01420-F

Descriptors: (*Germanium, Energy conversion), (*Thermoelectricity, Generators), (*Photoelectricity, Generators), (*Photoelectric cells (Semiconductor), Germanium), Epitaxial growth, Diodes (Semiconductor), Optical coatings, Etching, Optical properties, Electrical properties, Vapor plating, Titanium compounds, Silicon compounds, Zinc compounds, Sulfides.

Identifiers: Thermophotovoltaic converters.

Work was devoted to the continued development and improvement of germanium photovoltaic devices for use in a thermophotovoltaic TPV converter. This effort was divided into two broad categories. The first category encompassed experimentation attempting to optimize the electrical performance of the absorptive TPV device. The ultimate goal of this task was to maximize the power generation exhibited by the anti-reflection coated, absorptive, TPV device. The second category encompassed experimentation attempting to develop the vapor phase epitaxial technique for the deposition of germanium on germanium substrates. The ultimate goal of this task is to develop the epitaxial technique for use in the deposition of thin, heavily doped P+ layers on N-type germanium substrates for the fabrication of the non-absorptive N on P+ device structure. (Author)

N66-14965 **Field 10B**
CFSTI Prices: HC$3.00 MF$0.75
Hughes Aircraft Co., Culver City, Calif. Aerospace Group.
NON DISSIPATIVE SOLAR ARRAY OPTIMUM CHARGE REGULATOR.
Quarterly rept. no. 1.
Oct 65, 72p P65-125
Contract NAS5-9210
NASA-CR-69198

Descriptors: *Battery, *Solar cell, *Spacecraft power supply, *Voltage regulator, *Coupling, *Power transmission.

For abstract, see T 66 17.

N66-15621 **Field 10B**
CFSTI Prices: HC$3.00 MF$0.75
TRW Systems, Redondo Beach, Calif.
STUDY AND ANALYSIS OF SATELLITE POWER SYSTEMS CONFIGURATIONS FOR MAXIMUM UTILIZATION OF POWER.
Quarterly progress rept. no. 2, 19 Aug - 18 Nov 65.
by W. G. Binckley. 1965, 98p
Contract NAS5-9178
NASA-CR-69440

Descriptors: *Spacecraft power supply, *Systems analysis, *Optimization.

N66-15642 **Field 10B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
COLD PERFORMANCE EVALUATION OF A 4.59-INCH RADIAL-INFLOW TURBINE DESIGNED FOR A BRAYTON-CYCLE SPACE POWER SYSTEM.
by M. G. Kofskey, W. J. Nusbaum, and C. A. Wasserbauer. Feb 66, 21p NASA-TN-D-3260

Descriptors: *Cold flow test, *Performance characteristics, *Brayton cycle, *Gas turbine, *Radial flow.

N66-16056 **Field 10B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
COLD PERFORMANCE EVALUATION OF A 6.02-INCH RADIAL INFLOW TURBINE DESIGNED FOR A 10-KILOWATT SHAFT OUTPUT BRAYTON CYCLE SPACE POWER GENERATION SYSTEM.
by D. E. Holeski, and M. G. Kofskey. Feb 66, 25p
NASA-TN-D-2987-Rev

Descriptors: *Power generator, *Radial flow, *Turbogenerator, *Brayton cycle.

N66-18357 **Field 10B**
CFSTI Prices: HC$1.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Electronic Systems Lab.
A LOW-POWER HIGH-EFFICIENCY DC TO DC CONVERTER.
by J. K. Roberge. 1965, 16p
Grant NsG-234
NASA-CR-57391
Presented at 1965 Intern. Solid-State Circuits Conf., Philadelphia.

Descriptors: *Converter, *Electronic equipment, *Regulator.

N66-18464 Field 10B
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
STEADY-STATE PERFORMANCE OF A MODIFIED RANKINE CYCLE SYSTEM USING WATER.
by H. H. Coe, O. A. Gutierrez, and D. B. Fenn.
Mar 66, 37p NASA-TN-D-3333

Descriptors: *Power supply, *Rankine cycle, *Steady state.

AD-470 737 See Field 20D

PB-170 477 See Field 9C

10C. ENERGY STORAGE

AD-635 773 Field 10C
CFSTI Prices: HC$3.00 MF$0.50
Yardney Electric Corp., New York.
DEVELOPMENT OF THE HIGH RATE METAL-AIR DEPOLARIZED BATTERIES.
Quarterly technical rept. no. 3, 1 Jan-31 Mar 66.
by Allen Charkey. Jul 66, 52p
Contract DA-28-043-AMC-01614 (E)
Proj. DA-1C0-14501-A-34A
Task 00
ECOM-01614-3
See also AD-635 490.

Descriptors: (*Primary cells, Air), Performance (Engineering), Anodes (Electrolytic cell), Cathodes (Electrolytic cell), Aluminum, Zinc, Magnesium, Calcium, Electrolytes, Polarization.

A study was conducted to determine the performance characteristics and operational parameters for various metal-air couples. The anode materials being examined are Al, Ba, Ca, Mg, and Zn. They must discharge efficiently from -25F to 125F at rates from the 30 minute to 50 hour. Bootstrap heating for a 5 cell zinc-air battery was investigated at -25F. Useful capacity at the C/4 rate was about one half that obtained at room temperature and about double what would be obtained at -25F without bootstrap heating. Full sized 16 ampere-hour cells were designed, fabricated and tested. The watt-hour per pound performance of the finished prototype was in excess of 100 watt-hrs/lb. at the 1C discharge rate. A magnesium-air system of high efficiency was developed. The improvement was obtained by using sodium and lithium perchlorate instead of magnesium perchlorate electrolyte. Also, a eutectic solution of these two perchlorate salts gave acceptable performance down to -15F. Aluminum-air cells were studied in a free rather than an immobilized electrolyte system. The best performance was obtained in an electrolyte consisting of 20% KOH and 10% NaCl saturated with ZnO. Calcium anode behavior was studied in the polarization cell and in working calcium-air cells. The work quarter consisted of finding an electrolyte which was compatible with both the anode and cathode. (Author)

AD-635 776 Field 10C
CFSTI Prices: HC$5.00 MF$1.00
Yardney Electric Corp., New York.
DEVELOPMENT OF THE SEALED ZINC - SILVER OXIDE SECONDARY BATTERY SYSTEM.
Final technical rept. no. 8, 1 Jul 63-30 Jun 65.
by Martin Sulkes. Jul 66, 176p
Contract DA-36-039-AMC-02238 (E)
Projs. DA-3A99-09-022, DA-1C6-22001-A-053
Task 02
ECOM-02238-F
See also AD-621 583.

Descriptors: (*Alkaline cells, *Storage batteries), (*Battery separators, Storage batteries), Performance (Engineering), Hermetic seals, Life expectancy, Zinc, Silver compounds, Oxides, Reaction kinetics, Anodes (Electrolytic cell), Cathodes (Electrolytic cell).

Identifiers: Silver-zinc cells.

The reaction between Zn and oxygen was investigated during overcharge and on stand. The electrolyte level and the type of separator used in cells were the most important factors in the reaction rate. Investigation of the AgO-Ag2O hydrogen reaction showed that the rate increased with temperature, potential, the addition of Pd to the Ag and the mobility of the electrolyte. Sealed AgZn cells may be over discharged at the C/4 rate without developing excessive pressure. Electrochemically inactive or non-dischargeable zinc reacts with the oxygen generated during reversal. Physical, chemical, and electrical properties are presented for many separator and interseparator materials. Several inorganic separator materials were evaluated. Of the group, only S5520 warrants further testing. Evaluation cycling and cycle life data were obtained for 244 sealed silver zinc cells. The best results, up to 316-62 1/2 (depth of discharge cycles, were obtained from a cell with a 62% porous positive electrode, Teflon binder, 2% HgO and 1% Emulphogene BC 840 in the negative electrode, 42% KOH, and a separator consisting of 1 turn Pellon 6/5T C19 (300). Another separator system of interest consists of 1 turn Pellon 6/1T 2.2XH/2T FSC. Twenty five 41 AH silver-zinc cells were sealed in stainless steel cans. The terminal lead-through was by means of a vulcanized neoprene seal. (Author)

AD-636 153 Field 10C, 1C
CFSTI Prices: HC$1.00 MF$0.50
Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
SEALED AIRCRAFT BATTERIES.
Technical paper.
by R. A. Marsh. May 66, 18p AFAPL-CONF-66-3
Proj. AF-1873
Task 817304
Prepared for presentation at the Annual Power Sources Conference (20th), Atlantic City, N. J., 24-26 MAY 1966.

Descriptors: (*Alkaline cells, Aircraft equipment), Seals (Stoppers), Maintenance, Nickel, Cadmium, Performance (Engineering), Life expectancy, Compatibility, Airborne.

Technological advances in sealed alkaline batteries and battery charge - charge conditioning control techniques make the sealed battery system an attractive candidiate for aircraft application. Forecasted major advantages of sealed battery systems over existing vented aircraft batteries are: improved flight safety, reduced maintenance, longer service life, compatibility with aircraft electrical system, and system weight reduction. Utilization of sealed nickel-cadmium batteries for aircraft applications is considered possible by late 1968. Sealing the battery and integrating it with the aircraft electrical system introduces several major problems: compatibility with the environment and electrical system of the aircraft, providing a fast recharge capability, selecting and maintaining the proper voltage on charge, eliminating cell internal pressure buildup, developing reliable fail-safe features, and maintaining sealed operation for extended time periods. Efforts are in progress at the Air Force Aero Propulsion Laboratory to solve or to minimize these problems. The technical approaches, the progress in problem solution, and supporting technical data are reviewed. The approaches include: improvement of electrochemical performance, end-of-charge control techniques, and methods for conditioning the aircraft bus voltage for optimum battery performance. (Author)

N66-15538 Field 10C
CFSTI Prices: HC$2.00 MF$0.50
Institute for direct energy conversion, Univ. of Pennsylvania, Philadelphia.
THERMOPHYSICAL AND TRANSPORT PROPERTIES OF HIGH TEMPERATURE ENERGY STORAGE MATERIALS.
by H. Chang, and R. A. Sharma. 1964, 42p
Grant NsG-316
NASA-CR-53807
Presented at the Ann. Symp. (3rd), Tucson, Ariz.

Descriptors: *Energy storage, *Heat transfer, *High temperature material, *Material testing, *Physical property, *Transport property, *Thermal property.

For abstract, see T 66 17.

N66-17256 Field 10C
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
SILVER ZINC BATTERIES POWER SUPPLY FOR THE ATMOSPHERE EXPLORER-B SPACECRAFT (AE-B).
by P. C. Donnelly, and C. F. Palandati. Oct 65, 28p NASA-TM-X-55383, X-716-65-405

Descriptors: *Atmosphere, *Silver-zinc battery, *Charge, *Explorer satellite, *Power supply.

N66-18430 Field 10C
CFSTI Prices: HC$2.00 MF$0.50
General Electric Co., Schenectady, N. Y.
STUDY OF THE USE OF AUXILIARY ELECTRODES IN SILVER CELLS.
by W. N. Carson Jr, J. A. Consiglio, and J. W. Marr. Mar 66, 41p
Contract NAS5-3669
NASA-CR-405

Descriptors: *Gas cell, *Hydrogen recombination, *Oxygen recombination, *Cadmium, *Silver-zinc battery.

11A. ADHESIVES AND SEALS

AD-636 100 Field 11A, 7C, 11I
CFSTI Prices: HC$1.00 MF$0.50
Picatinny Arsenal, Dover, N. J. Plastics and Packaging Lab.
SYNTHESIS OF A POLYEPOXIDEPOLYHYDROXY ETHER.
Technical rept.
by W. C. Turner, and E. A. Hoess. Jul 66, 19p
Proj. DA-1C024401A329
PA-TR-3323

Descriptors: (*Adhesives, Epoxy plastics), (*Epoxy plastics, Synthesis (Chemistry)), Ethers, Polymers, Crosslinking (Chemistry), Thermosetting plastics, Solubility.

Identifiers: Polyethers, Polyepoxide polyhydroxy ethers.

The primary objective of the work was to chemically modify a polyhdroxy ether based on bisphenol A and epichlorohydrin by incorporating pendant gylcidyl groups for crosslinking. A polyhydroxy ether was converted to a thermosetting polyepoxidepolyhydroxy ether. Approximately six epoxy groups per molecule (DP 100) were incorporated: when crosslinked through the epoxy groups with m-phenylene diamine, the polymer became insoluble in dioxane whereas the original polymer was soluble. (Author)

AD-636 260 Field 11A, 13J, 11L
CFSTI Prices: HC$2.00 MF$0.50
Forest Products Lab., Madison, Wis.
EVALUATION AND DEVELOPMENT OF ADHESIVES FOR MARINE ASSEMBLY GLUING.
Research rept.
by M. L. Selbo. Jul 66, 34p Rept. no. 66-017
Proj. SR-007-03-02
Task 1004
Prepared in cooperation with Wisconsin Univ., Madison.

Descriptors: (*Marine engineering, *Adhesives), (*Wood, Adhesives), (*Epoxy plastics, Adhesives), Boats, Ship structural components, Bonding, Bonded joints, Mechanical properties, Vinyl plastics, Moisture, Surface properties.

A study was made to search out or develop, by modification, adhesives suitable for such applications as bonding the various layers in multiple planking of boats and ships, as well as other uses where the grain of adjacent layers of wood is at an appreciable angle. It was assumed that adhesives of the resorcinol type probably would be too rigid for such applications, and this undoubtedly is true where high-density wood species having high shrinkage characteristics are involved. Because epoxies shrink very little on curing and generally require only light gluing pressure, it was thought that they might have a better chance than resorcinols for certain assembly gluing applications, particularly if their water resistance could be improved to meet rigid service requirements. While most epoxies, as well as some other adhesive materials studied, had extremely low water resistance (especially so with denser woods), a few showed some promise in short-term tests, particularly when modified with asbestos. With some of these adhesives, bandsawn surfaces gave definitely improved results over smoothly jointed or planed surfaces. (Author)

N66-15545 **Field 11A**
CFSTI Prices: HC$3.00 MF$0.75
Republic Aviation Corp., Farmingdale, N. Y.
HIGH TEMPERATURE HYDRAULIC SYSTEM ACTUATOR SEALS FOR USE IN ADVANCED SUPERSONIC AIRCRAFT.
Semiannual rept. no. 1.
by J. Lee. 14 Oct 65, 76p FHR-2702-1
Contract NAS3-7264
NASA-CR-54496

Descriptors: *High temperature material, *Hydraulic actuator, *Sealant, *Supersonic aircraft.

For abstract, see T 66 17.

AD-635 592 **See Field 11F**

AD-635 651 **See Field 13E**

11B. CERAMICS, REFRACTORIES, AND GLASSES

AD-635 587 **Field 11B, 20B, 13H**
CFSTI Prices: HC$3.00 MF$0.75
Lexington Labs., Inc., Cambridge, Mass.
DETERMINATION OF THE FEASIBILITY OF FORMING REFRACTORY FIBERS BY A CONTINUOUS PROCESS.
Final rept. 25 Feb 63-14 Jun 65.
by William B. Campbell. Jun 66, 85p
Contract DA-19-020-AMC-0068 (X)
Proj. DA-1A024401A110
AMRA-CR-63-03/8F
See also AD-603 455.

Descriptors: (*Refractory materials, Fibers), (*Whiskers (Crystals), Refractory materials), (*Ceramic fibers, Material forming), Aluminum compounds, Oxides, Vapor plating, Crystal growth, Single crystals, Oxidation, Chlorides, Halides, Thermochemistry, Vapors, Processing.

The feasibility of forming whiskers by vapor phase reaction was demonstrated. Whiskers of several materials were grown by oxidation (or reduction) and deposition from the vapor phase, including A1203, Si3N4, SiO2 and B. Principal effort was directed at producing whiskers A12O3 utilizing the reaction: 2A1C13 (g) + 3CO2 (g) + 3H2 (g) reversibly yields A12O3 (s) + 6CH1 (g) + 3CO (g). Whiskers were grown on stationary substrates and gas-borne nuclei, although limited success was achieved with the latter. Whisker diameter appeared related to the grain size of the substrate or nuclei. High quality whiskers were produced by the process in terms of strength and length to diameter ratio. Measured mechanical properties compared very favorably with reported values obtained from whiskers formed by other processes. A special apparatus was developed for determining mechanical properties. The halide vapor reaction process appears amenable to high production rates because of the potential for continuous production techniques when compared to the batch production processes used presently. Purity and perfection are readily controllable. (Author)

AD-635 621 **Field 11B, 20M**
CFSTI Prices: HC$4.00 MF$1.00
Lexington Labs., Inc., Cambridge, Mass.
THERMAL RADIATION CHARACTERISTICS OF TRANSPARENT SEMI-TRANSPARENT AND TRANSLUCENT MATERIALS UNDER NON-ISOTHERMAL CONDITIONS.
Final technical rept.
by Henry A. Hobbs, and Robert C. Folweiler.
Mar 66, 128p
Contract AF 33 (657)-11280
Proj. AF-7360
Task 736001
ASD-TDR-62-719-Pt-3

Descriptors: (*Ceramic materials, Thermal radiation), (*Transparent panels, Thermal radiation), Aluminum compounds, Oxides, Strontium compounds, Titanates, Heat transfer, Absorption, Thermal conductivity, High-temperature research, Diffusion, Light transmission, Scattering, Perturbation theory, Numerical analysis, Microstructure.

Identifiers: Pyroceram.

Over the range of wavelengths from one to six microns where oxide ceramics are partially transparent, radiant energy emission must be treated as a volume rather than a surface phenomena. As a result the absorption coefficient (mainly determined by microstructure) are important variables. In addition, temperature gradients affect radiant energy emission so that the effective 'emissivity' under non-isothermal conditions is neither a material constant nor a sample constant. Analytical relationships were derived for spectral radiant energy emission as a function of absorption coefficient, scattering coefficient, surface temperature and temperature gradient. Experimental measurements of non-isothermal radiant energy emission of Al2O3 and SrTiO3 samples are in agreement with these calculations. Analytical relations and experimental measurements for diffuse and parallel light transmission are reported. Comparison of the Hamaker approximation with an exact solution show that the approximation is suitable for these materials and conditions. (Author)

AD-635 694 **Field 11B, 20B**
CFSTI Prices: HC$1.00 MF$0.50
Avco Corp., Wilmington, Mass. Space Systems Div.
SINGLE CRYSTAL ALUMINA BY THE STRAIN-ANNEAL TECHNIQUE.
Summary rept. 25 Mar 65-24 Mar 66.
by D. J. Sellers, W. H. Rhodes, and T. Vasilos.
24 Mar 66, 16p
Contract NOw-65-0316-f
Proj. WR-007-02-01
See also AD-630 776.

Descriptors: (*Refractory materials, Single crystals), (*Aluminum compounds, Oxides), (*Crystal growth, Refractory materials), Porosity, Microstructure, Strain (Mechanics), Annealing, Recrystallization, Defects (Materials).

Single crystals of Al2O3 were grown by the strain-anneal technique to a maximum size of 7 cubic centimeters. All the crystals contained a small percentage of porosity, and cracking at the boundary of the polycrystalline region also appeared to be an experimental difficulty. The critical strain for producing few growth nuclei, and thus enhanced single crystal growth, is thought to be approximately 5%. Evidence was obtained for the removal of porosity during grain growth accompanying primary recrystallization. (Author)

BNWL-198 **Field 11B, 18J**
CFSTI Prices: HC$4.00 MF$1.00
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
CERAMICS RESEARCH AND DEVELOPMENT QUARTERLY REPORT, JULY-SEPTEMBER 1965.
1965, 132p
Contract AT (45-1)-1830

Descriptors: (*Ceramic materials, Scientific research).

For abstract, see N 20 15.

GEMP-400A **Field 11B, 11F, 18J**
CFSTI Prices: HC$6.00 MF$1.50
General Electric Co., Cincinnati, Ohio. Nuclear Materials and Propulsion Operation.
HIGH-TEMPERATURE MATERIALS PROGRAMS, PART A.
Final annual rept.
28 Feb 66, 287p
Contract AT (40-1)-2847

Descriptors: (*Reactor materials, Heat-resistant metals + alloys), (*Heat-resistant metals + alloys, Reactor materials).

For abstract, see N 20 15.

GEMP-58A **Field 11B, 18J**
CFSTI Prices: HC$3.00 MF$0.75
General Electric Co., Cincinnati, Ohio. Nuclear Materials and Propulsion Operation.
HIGH-TEMPERATURE MATERIALS PROGRAM PROGRESS REPORT NO. 58, PART A.
29 Apr 66, 60p
Contract AT (40-1)-2847

Descriptors: (*Reactor materials, Heat-resistant metals + alloys), (*Heat-resistant metals + alloys, Reactor materials).

For abstract, see N 20 15.

N66-15387 **Field 11B**
CFSTI Prices: HC$2.00 MF$0.50
Dynatech Corp., Cambridge, Mass.
SOME THERMOPHYSICAL PROPERTY MEASUREMENTS OF POROUS CERAMIC: GLASS-ROCK.
by P. C. Dustin, L. C. Hoagland, and R. L. Wentworth. 13 May 65, 29p DYNATECH-558
Contract NAS1-4758
NASA-CR-66043

Descriptors: *Ceramics, *Conductivity, *Density measurement, *Specific heat, *Thermophysical property, *Porous material.

N66-16152 **Field 11B**
CFSTI Prices: HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
KINETICS OF GRAPHITIZATION. I - THE HIGH-TEMPERATURE STRUCTURAL TRANSFORMATION IN PYROLYTIC CARBONS.
by D. B. Fischbach. 1 Feb 66, 40p JPL-TR-32-532
Contract NAS7-100
NASA-CR-69917

Descriptors: *Crystal structure, *Pyrolytic graphite, *Kinetics, *Physical property.

N66-18024 **Field 11B**
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., Calif., Inst. of Tech., Pasadena.

ANALYSIS OF HIGH TEMPERATURE CREEP IN PYROLYTIC CARBON.
by W. V. Kotlensky. 15 Feb 66, 17p JPL-TR-32-889
Contract NAS7-100
NASA-CR-70637

Descriptors: *High temperature material, *Pyrolytic graphite, *Carbon, *Creep analysis, *Tensile creep.

PB-170 444 **Field 11B**
CFSTI Prices: HC$3.00 MF$1.00
Maine State Highway Commission.
DURABILITY OF CONCRETE.
Final rept. on soil mechanics series.
by Wilbur J. Dunphy. Jun 65, 171p Technical paper TP-65-3
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Concrete, Aging (Materials)), Sealing compounds, Additives, Moisture-proofing, Composite materials, Calcium compounds, Sodium compounds, Chlorides, Test methods, Coatings, Surface properties, Maine.

Identifiers: Aggregates (Materials), Calcium chloride, Sodium chloride.

The purpose of this study is (a) to evaluate the use of some admixtures in concrete and/or mortar, (b) to observe the effects of some types of salt solutions on concrete and/or mortar, and (c) to test some types of joint sealants. The ultimate goal of this study is to assist in making possible good drable concrete. The report intends to finalize the data accumulated to date for admixture, joint sealants, and surface coatings.

PB-170 482 **Field 11B, 13B**
CFSTI Prices: HC$4.00 MF$0.75
Bureau of Reclamation, Denver, Colo. Concrete and Structural Branch.
SOME FACTORS INFLUENCING DURABILITY OF CONCRETE FLAMING GORGE DAM COLORADO RIVER STORAGE PROJECT.
by G. O. Briggs. 20 Jan 66, 44p Rept. no. C-1178

Descriptors: (*Dams, Concrete), (*Concrete, Dams), Rock (Geology), Processing, Physical properties, Shale, Freezing, Utah.

Identifiers: Aggregates (Materials).

Laboratory tests determined treatment of marginal quality aggregate necessary to produce durable concrete for Flaming Gorge Dam in north-eastern Utah, an area of severe climatic exposure. Results indicated that improving aggregate quality by heavy media processing increased durability of the resulting concrete. A pulp (slurry of ferrosilicon-magnetite and water) density of 2.50 specific gravity was found to be optimum from the standpoint of economy and improvement in aggregate quality. Calcined shale pozzolan selected to improve workability and reduce heat generation of concrete decreased freezing and thawing durability. Various temperatures of pozzolan calcination were investigated and the optimum temperature determined to be 1600F. Durability of hardened concrete containing pozzolan could not be positively related to temperature of calcination but was found to be reduced by use of pozzolan. Results reported provide the basis for the specifications requirement to omit pozzolan from exposed (exterior) concrete in the faces of the dam. (Author)

PB-170 865 **Field 11B**
CFSTI Prices: HC$2.00 MF$0.50
Virginia Council of Highway Investigation and Research, Charlottesville.
AN INVESTIGATION OF THE DELAY PERIOD AND RELATED FACTORS IN STEAM CURED CONCRETE.
by H. E. Brown. Apr 65, 48p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Concrete, Aging (Materials)), (*Cements, Aging (Materials)), Steam, Gypsum, Time, Temperature, Sulfur compounds, Oxides, Compressive properties, Test methods, Virginia.

Identifiers: Sulfur trioxide.

Studies showed that principally because of differences in their chemical composition cements have unique setting rates and produce concretes of different strengths and, in all probability, of varying durability. This investigation was designed to evaluate, in terms of early (one-day) strength, the effect of variations of time and temperature in the particular phases that make up a steam curing cycle on concretes containing cements of different setting rates. The investigation was divided into two phases, the purpose of the first phase being to determine: (1) if the optimum delay period (for producing macimum early strength) for a given concrete could be correlated to its stiffening rate as measured by the Penetration Resistance Needle Test (Proctor Method), and (2) what influence the type of cement and the different factors of a steam curing procedure have on the length of delay period. The purpose of the second phase was to learn how marked the effect of the gypsum content (expressed in cement analysis as percent S03) was on the early strength of steam cured concrete containing type III cement and to determine approximately the optimum content in keeping with maximum strength and minimum expansion.

PB-170 872 **Field 11B**
CFSTI Prices: HC$3.00 MF$0.75
Ohio State Univ., Columbus. Engineering Experiment Station.
DEVELOPMENT OF A STRENGTH DESIGN METHOD FOR ASPHALTIC CONCRETE MIXTURES USING A LOADING TIME-TEMPERATURE SUPERPOSITION PROCEDURE.
Final rept.
by Robert P. Lottman. Jan 66, 85p EES-239-3, 0491
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Asphalt, Creep), (*Concrete, Creep), Mixtures, Design, Loading (Mechanics), Time, Temperature, Strain (Mechanics), Test methods, Strain gages, Graphics, Ohio.

Identifiers: Aggregates (Materials).

The study investigated the possibility of using unconfined compressive creep tests as part of the strength evaluation procedure for designing asphaltic mixtures. Cylindrical test specimens, 4 inches in diameter and 8 inches high, were made which represented a variety of asphaltic mixtures, aggregate-asphalt proportions and aggregate types. Strain measurements were obtained from unconfined compressive creep tests under constant loading and at four temperatures ranging from 47F to 92F. Master curves for comparing mixture differences were developed from isothermal plots of log. creep modulus vs. log. loading time using a loading time-temperature superposition procedure. Strength indices from Marshall and maximum unconfined compressive strength tests were used to compare mixtures relative to the transformed creep modulus-time results. Tentative specification requirements for mixture design are discussed relative to these transformed creep moduli and to temperature susceptibility properties. Test results for the asphalt plant surfacing mixtures are compared to the tentative limits. (Author)

AD-636 192 **See Field 20K**

AD-636 276 **See Field 20M**

BNWL-113-15 **See Field 5B**

PB-170 876 **See Field 13B**

11C. COATINGS, COLORANTS, AND FINISHES

AD-635 647 **Field 11C, 11F, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Institute of Modern Languages, Inc., Washington, D. C.
ON ANODIC OXIDATION OF ALUMINUM IN CHROMIC ACID.
by F. Modic. Jun 66, 35p
Contract DA-44-009-AMC-1563 (T)
Proj. DA-1C024401-A328
ERDL-T-1854-66, TT-66-61781
Neuere Erfahrungen auf dem Gebiete der Anodischen Oxydation von Aluminum in Chromsaure, trans. of Aluminum (West Germany) v39 p169-80 1963.

Descriptors: (*Anodic coatings, *Aluminum), Oxidation, Chromic acids, Direct current, Processing, West Germany.

Particular attention was here given to working with bath temperatures above 45 degrees C. Oxide films are here formed much quicker than with the earlier low bath temperatures and are characterized by an attractive and completely opaque appearance. They can also be dyed relatively quickly in saturated tints. They thus become highly suitable for decorative purposes which was not the case in the past. The report also discusses in detail the influence of impurity anions in the chromic acid bath and specifically the effect of sulfate ions on the opaqueness of the anodized items. It further makes suggestions on the control of the bath and/or possibilities of regeneration in the chromic acid process and gives some indications in regard to cost calculation. (Author)

AD-635 687 **Field 11C, 11F**
CFSTI Prices: HC$2.00 MF$0.50
Institute of Modern Languages, Inc., Washington, D. C.
ON THE FORMATION OF OXIDE FILMS ON ALUMINUM.
by W. Kaden. Jun 66, 31p
Contract DA-44-009-AMC-1563 (T)
Proj. DA-1C024401A328
TT-66-61785, AERDL-T-1849-66
Beitrag zu den Wachstumsvorgangen von Oxidschicht-en auf Aluminum, Trans. of Aluminum, (West Germany) v39 p33-41 1963.

Descriptors: (*Anodic coatings, Aluminum), (*Films, Oxides), (*Aluminum, Oxidation), West Germany, Measurement, Thickness, Preparation.

Aluminum specimens provided with different types of oxide films were investigated for the purpose of obtaining a new insight into the mechanism of development of the oxide films. It was desirable here to carry out the measurements on optimum defined layers with optimum absence of impurities. This requirement was best satisfied, as found from a comparison of aluminum of different degrees of purity, by Erftal, a 99.9-% pure commercial grade. Comparison of different measuring methods and the preparation of specimens of known barrier-layer thickness determined that the latter can be measured through capacitance of the specimens and independently of the possible existence of a cover layer. (Author)

N66-15791 **Field 11C**
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
THERMAL RADIATION ABSORPTANCE AND VACUUM OUTGASSING CHARACTERISTICS OF SEVERAL METALLIC AND COATED SURFACES.
by E. Anagnostou, P. E. Colarusso, and T. Mimura. Feb 66, 58p NASA-TN-D-3234

Descriptors: *Absorption, *Thermal radiation, *Protective coating.

For abstract, see T 66 17.

N66-17343 Field 11C
CFSTI Prices: HC$2.00 MF$0.50
IIT Research Inst., Chicago, Ill.
PREPARATION OF S-13 EXPERIMENTAL COATINGS.
Final rept. 29 Oct 63-31 Aug 65.
by G. A. Zerlaut. 14 Dec 65, 40p IITRI-U6018-1
Contract NAS8-11967
NASA-CR-70385

Descriptors: *Pegasus satellite, *Silicone, *Thermal protection, *Elastomer, *Protective coating.

AD-635 593 See Field 13J

AD-635 629 See Field 20F

AD-635 648 See Field 11F

AD-635 649 See Field 13H

AD-635 670 See Field 20F

AD-635 858 See Field 9E

AD-635 963 See Field 8L

AD-636 210 See Field 13H

AD-636 279 See Field 11K

PB-170 604 See Field 11L

11D. COMPOSITE MATERIALS

AD-636 146 Field 11D, 13J
CFSTI Prices: HC$2.00 MF$0.50
Naval Ordnance Lab., White Oak, Md.
MEANS FOR INCREASING INTERLAMINAR SHEAR RESISTANCE IN FILAMENT WOUND STRUCTURES.
Interim rept.
by Carl C. Mueller, S. P. Prosen, and F. Robert Barnet. 8 Jun 66, 49p NOLTR-66-85
Proj. RRMA-03-043/212-1/R007-04-01

Descriptors: (*Filament wound construction, *Composite materials), (*Submarine hulls, Filament wound construction), Glass textiles, Reinforcing materials, Epoxy plastics, Whiskers (Crystals), Shear stresses, Deep submergence, Additives, Aluminum compounds, Nitrides, Oxides, Compressive properties.

Engineering evidence supports the belief that performance of filament wound glass reinforced plastics structures is limited by interlaminar shear resistance. Different mechanical techniques were devised, which for a given composite system, lead to significant improvements in inter-laminar shear strength. This was demonstrated on uniaxially wound NOL Rings: first, when very small fibers and/or whiskers were incorporated into the resin in low percentages and, second, when fiberfoamed glass roving was used as the basic reinforcement. However, it was noted that some loss in compression modulus must be suffered. (Author)

11F. METALLURGY AND METALLOGRAPHY

AD-472 818 Field 11F
CFSTI Prices: HC$3.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
THE EFFECT OF TEMPERATURE ON THE YIELD PROPERTIES OF AN INTERNALLY OXIDIZED COPPER-ALUMINIUM ALLOY.
Technical rept.
by G. Dorey. Jun 65, 29p TR-65126

Descriptors: (*Copper alloys, *High-temperature research), Aluminum alloys, Metallic crystals, Oxidation, Tensile properties, Electron microscopy, Single crystals, Crystal growth, Creep, Stresses, Hardness, Degradation, Copper, Crystal lattice defects, Canada, Molecules.

The experimental techniques employed in a study of the yield properties of internally oxidized copper alloys are described and the results for Cu-0.47 wt% Al are given. Single crystals of the internally oxidized alloy were pulled in a tensile testing machine to plastic strains of about .004 at various temperatures from 78 to 1173K. The effect of sudden changes in strain rate on the flow stress was studied at 673 and 873 K. Electron microscope specimens were prepared from some of the strained specimens to determine the dislocation arrangements and the size and spacing of oxide particles. It was concluded that up to 500 K most dislocations remained in their original slip planes and passed particles by bowing between them, but at higher temperatures yield was thermally activated and most probably occurred by a cross-slip mechanism. (Author)

AD-475 863 Field 11F
CFSTI Prices: HC$2.60 MF$0.50
Naval Research Lab., Washington, D. C.
THE EFFECTS OF THREE AQUEOUS ENVIRONMENTS ON HIGH-STRESS LOW-CYCLE FATIGUE OF AN 18% NICKEL MARAGING STEEL.
Memo. rept.
by C. D. Beachem, T. C. Lupton, and J. A. Kies.
Jun 65, 29p NRL-MR-1627

Descriptors: (*Maraging steels, *Corrosive liquids), Environmental tests, Corrosion, Metal plates, Stresses, Strain (Mechanics), Fatigue (Mechanics), Bending, Corrosion inhibition, Solutions, Welds, Experimental data, Mathematical prediction, Performance (Engineering), Pressure vessels, Cantilever beams, Fracture (Mechanics), Chromates, Rocket cases, Nickel alloys.

Side-grooved plane-strain cantilever bend specimens of a 200 KSI yield strength grade of 18% Ni maraging steel were tested in distilled water, water inhibited with Na_2Cr_04, and 3-1/2% saline solution, to determine the steel's susceptibility to these environments while under high stress and low cycle fatigue conditions. In the locations and orientations (of cracks) tested, these environments were found to be not very aggressive under the selected fatigue conditions in either the base plate or the weld metal, with less than 0.001 in. of crack growth per cycle at stress intensities of slightly greater than 100 KSI (sq. root inches). Greater propagation rates were found in the range of 105 to 130 KSI (sq. root inches) with a maximum propagation rate of 0.006 in. per cycle at 120 KSI (sq. root inches). Dead-weight loaded specimens of base plate material showed crack propagation (to fracture) at stress intensities down to 74 KSI (sq. root inches) during long term (days) exposure in the NaCl solution. (Author)

AD-476 857 Field 11F
CFSTI Prices: HC$1.50 MF$0.50
Naval Air Engineering Center, Philadelphia, Pa. Aeronautical Materials Lab.
APPLICATION OF POTENTIOSTATIC AND GALVANOSTATIC TECHNIQUES TO THE STUDY OF INTERGRANULAR CORROSION IN HIGH STRENGTH ALUMINUM ALLOYS.
Final rept. Jan 64-Jun 65.
by Sara J. Ketcham. 29 Oct 65, 23p NAEC-AML-18-R360FR101

Descriptors: (*Aluminum alloys, *Corrosion), Heat treatment, Grain structures (Metallurgy), Quenching (Cooling), Electrochemistry, Stresses, Stress corrosion, Polarization, Copper alloys, Magnesium alloys, Anodes (Electrolytic cell), Cathodes (Electrolytic cell), Microstructure.

The effect of slow quenching following solution heat treatment on naturally aged Al-Cu-Mg alloy can be detected by corrosion potentials and accelerated corrosion tests for intergranular corrosion and stress corrosion susceptibility. Faster quenching rates give no indication of the existence of any continuous anodic paths until a stress is applied. A possible mechanism for this is proposed based on the electrochemical effect of stress which is believed to be the result of strain induced depolarization of the anodic phase or phases and stress induced increase in the surface activity of hydrogen ions. (Author)

AD-635 553 Field 11F, 19F
CFSTI Prices: HC$5.60 MF$0.75
Watertown Arsenal Labs., Mass.
METALLURGICAL ADVISORY COMMITTEE ON TITANIUM. INFORMATION BULLETIN NO. T5. PROCEEDINGS OF THE TITANIUM SYMPOSIUM AT WATERTOWN ARSENAL, WATERTOWN, MASSACHUSETTS, 8 OCTOBER 1952.
1952, 59p WAL-952.3/2
Previously as PB-109 046, CFSTImi$2.75, ph$7.50.

Descriptors: (*Titanium, *Symposia), Titanium alloys, Ordnance, Forging, Cold working, Corrosion, Welding, Machining, Mechanical properties, Processing, Corrosion-resistant alloys.

The symposium was devoted to a practical discussion of the properties, processing, machineability, and similar characteristics of titanium. This metal is being developed as a strategic ordnance material because of its lightness, combined with its high strength. Attention was focused on the phases of the new metal that would be most helpful to industry and commercial fields as well as to Ordnance.

AD-635 592 Field 11F, 11A, 13J
CFSTI Prices: HC$1.00 MF$0.50
Navy Marine Engineering Lab., Annapolis, Md.
GALVANIC CORROSION BEHAVIOR OF WEAR-RESISTANT MATERIALS FOR MECHANICAL SHAFT SEALS.
Research and development phase rept.
by D. C. Vreeland. Jul 66, 15p MEL-242/66
Proj. S-F013-07-01
Task 3723

Descriptors: (*Metal seals, *Corrosion), Electrolysis, Shafts, Submarines, Wear resistance, Corrosion-resistant alloys, Cobalt alloys, Chromium alloys, Tungsten alloys, Nickel alloys, Molybdenum alloys, Vanadium alloys, Copper alloys, Lead alloys, Tin alloys, Titanium compounds, Carbides, Tungsten compounds, Sea water, Rings, Powder alloys, Seals (Stoppers).

Shaft seals currently used on submarines employ mating wear surfaces which are supported by Monel carrier rings. Galvanic corrosion effects between various candidate mating materials and Monel have been investigated by the exposure of couples in seawater. The 14 materials exposed included seven cobalt-chromium alloys, six sintered carbide materials, and one copper-lead-tin alloy. The results indicate that galvanic coupling to Monel had no adverse effect on the corrosion behavior of five of the cobalt-chromium alloys, and one of the sintered carbide materials. (Author)

AD-635 596 Field 11F
CFSTI Prices: HC$1.00 MF$0.50
Army Materials Research Agency, Watertown, Mass. Materials Engineering Div.
PETCH ANALYSIS OF HYDROGENATED TANTALUM SHEET.
Technical rept.
by George E. Gazza. May 66, 13p
Proj. DA-1C024401A110
Task 36744
AMRA-TR-66-10

Descriptors: (*Hydrogen embrittlement, Tantalum), (*Tantalum, Low-temperature research), (*Hydrogenation, Tantalum), Sheets, Ductility, Hydrogen, Impurities, Stresses, Cryogenics, Tensile properties, Grain structures (Metallurgy).

Identifiers: Petch analysis.

The anomalous behavior in ductility exhibited by tantalum, at low temperature, with hydrogen as an impurity was investigated utilizing a Petch-type analysis. The change in lattice friction stress and dislocation locking stress parameters were determined through a temperature range from room temperature to -196C. The results of the investigation show the locking stress remained essentially unchanged by small hydrogen additions while the lattice friction stress increased significantly at temperatures below -78C. (Author)

AD-635 630 **Field 11F, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Carnegie Inst. of Tech., Pittsburgh, Pa.
SOME EFFECTS OF NITROGEN ON THE RESISTANCE TO STRESS CORROSION CRACKING OF TYPE 304 STAINLESS STEEL WIRES.
Technical paper.
by Walter A. Mannheimer, and Harold W. Paxton. 15 Jun 66, 16p
Contract Nonr-760 (14)
Proj. NR-036-029

Descriptors: (*Stainless steel, *Stress corrosion), Nitrogen, Austenite, Fracture (Mechanics), Case hardening.

Identifiers: Stainless steel 304.

In recent work on stress corrosion cracking, the role of alloying elements which may effect dislocation distribution and cracking has been discussed. Nitrogen has been introduced into austenitic stainless steels in the solid state from NH3/H2 mixtures at temperatures in the range 600-750C. The resistance to cracking is markedly improved. The reasons for this improvement are under investigation. (Author)

AD-635 635 **Field 11F, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Titanium Metals Corp. of America, New York.
DEVELOPMENT OF A STABLE-BETA TITANIUM ALLOY.
Quarterly rept. no. 14, 1 Oct-31 Dec 65.
by D. B. Hunter. 31 Dec 65, 44p
Contract DA-30-069-ORD-3743
Proj. DA-59332008
WAL-TR-405/2-13
See also AD-631 185.

Descriptors: (*Titanium alloys, Aging (Materials)), Fatigue (Mechanics), Notch toughness, Stress corrosion, Dispersion hardening, Creep, Deformation, Welds, Ductility, Tensile properties, Aluminum alloys, Iron alloys, Vanadium alloys, Molybdenum alloys.

Identifiers: Titanium alloy 3Al2Fe8Mo8V.

The evaluation of Ti-8Mo-8V-2Fe-3Al was completed. The notch (K sub t=3.5) fatigue limit of this alloy when aged to a strength level of 180 Ksi was shown to lie in the range of 30-35 Kpsi for 10 million cycles, and its plane strain crack propagation resistance, K sub ic, was 45-60 Kpsi square root of (in). Hot salt stress corrosion tests showed that the maximum stress tolerated for 200 hours at 600F without cracking occurring was 50 Kpsi, and at 800F, 25 Kpsi. Full range creep curves, using 500 hour exposure times, were obtained. Room temperature bend tests showed that stabilized material could be bent to a tighter radius than aged material, but that at 1100-1400F, all samples could pass a 3T bend. Weldability studies indicated that when welded, all samples were ductile with yield strengths around 120 Kpsi, but that aging after welding produced high strengths. As-welded bend values of 3T or less were found. When welded samples were exposed for 500 hours at 650F in the aged stabilized conditions, some ductility was retained. (Author)

AD-635 648 **Field 11F, 11C**
CFSTI Prices: HC$1.00 MF$0.50
Institute of Modern Languages, Inc., Washington, D. C.
ON THE FORMATION OF NOT COMPLETELY WEAR-RESISTANT COATINGS ON THE ANODIC OXIDE FILM WHEN ADDING CERTAIN DYES TO THE SEALING BATH.
by F. Modic. Jun 66, 15p
Contract DA-44-009-AMC-1563 (T)
Proj. DA-1C024401-A328
ERDL-T-1855-66, TT-66-61782
Ueber die Bildung Nicht Abriebfester Auflagen auf der Anodischen Oxydschicht beim Zusatz Gewisser Farbstoffe Zum Sealbad, trans. of Aluminum (West Germany) v36 p457-61 1960.

Descriptors: (*Aluminum, Anodic coatings), (*Anodic coatings, *Dyes), Wear resistance, Oxides, Films, Sealing compounds, Complex compounds, Molecular properties, Solubility, Salicylic acids, West Germany.

The report discusses the phenomenon of seal-action of certain dyestuffs added in small amounts to the sealing bath. It was confirmed that the seal-action can be related in all dyestuffs concerned to their molecular constitution. For their respective bahavior are responsible certain specific chelate-forming groupings in the dyestuff molecule. Corresponding to these groupings, all seal-active dyestuff were subdivided into four classes. Dyestuffs with these groupings are capable of entering into a metallic complex during the sealing process with the not wear-resistant coating formed on the surface of the anodic film. It is most probable that the aluminum-complex dyestuff thus formed becomes water-soluble. This is the reason why this process produces after sealing always a shiny and wear-resistant anodic oxide film where the surface of the latter is completely free of not wear-resistant reaction products. (Author)

AD-635 682 **Field 11F, 18N, 18J**
CFSTI Prices: HC$2.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
ELECTROCHEMICAL CORROSION STUDIES OF SNAP CONTAINER MATERIALS.
by D. A. Kubose, and H. I. Cordova, 7 Jun 66, 28p USNRDL-TR-1036
Contract AT (49-5)-2084

Descriptors: (*Corrosion, *Reactor materials), (*Corrosion-resistant alloys, Sea water), Power reactors, Containers, Electrolysis, Nickel alloys, Molybdenum alloys, Iron alloys, Chromium alloys, Tungsten alloys, Cobalt alloys.

Identifiers: SNAP, Haynes-25 (Alloy), Hastelloy C, Hastelloy N.

Corrosion rates of Haynes 25, Hastelloy C and Hastelloy N in natural seawater were determined by galvanostatic polarization techniques. Values of approximately 0.01 mils per year were obtained for each of the alloys. No significant effect of aeration and solution stirring on the corrosion rates was observed. (Author)

AD-635 696 **Field 11F, 13J**
CFSTI Prices: HC$3.00 MF$0.75
Illinois Univ., Urbana.
LOW-CYCLE FATIGUE BEHAVIOR OF AXIALLY LOADED SPECIMENS OF MILD STEEL.
Progress rept. no. 3.
by J. T. P. Yao, and W. H. Munse. 24 Jun 63, 80p
Contracts NObs-77139, NObs-84321
Proj. SR-149
SSC-151
Previously announced Aug 63 as PB-181-505 CFSTI$2.25.

Descriptors: (*Steel, Ship plates), (*Fatigue (Mechanics), Steel), Loading (Mechanics), Deformation, Strain (Mechanics), Theory.

Studies have been conducted to evaluate the low-cycle high-stress fatigue behavior of several ship steels under a variety of loading conditions. On the basis of these tests and related studies reported in the literature a general hypothesis describing the cumulative effect of plastic deformations has been developed. With this hypothesis the deformation obtained in a single loading may be used to describe or predict the basic low-cycle fatigue behavior of mild steels for lives up to approximately 1,000 cycles. Furthermore, limited correlations with existing data from other investigations suggest that it may also be possible to extend the hypothesis to metals other than steel. (Author)

AD-635 697 **Field 11F, 20L**
CFSTI Prices: HC$2.00 MF$0.50
Wayne State Univ., Detroit, Mich. Dept. of Metallurgical Engineering.
THE Ni3Al ORDERING SYSTEM.
Technical rept.
by Clark L. Corey, and Begdan Lisowsky. Jun 66, 30p TR-1
Contract Nonr-4520 (00)
Proj. NR-031-703

Descriptors: (*Nickel alloys, Phase studies), (*Aluminum alloys, Phase studies), Resistance (Electrical), X-ray spectrum, Microstructure, Grain structures (Metallurgy), Crystal lattices, Quenching (Cooling).

Identifiers: Order-disorder theory.

Electrical resistivity, x-ray line positions, degree of order, and microstructures have been investigated for Ni-Al alloys near the Ni3Al composition. The results indicate that Ni3Al undergoes disordering between 1250C and the M.P., also supersaturated gamma, produced in gamma + gamma' alloys by gas-quenching, is extensively ordered prior to gamma' (Ni3Al) phase separation. The latter reaction, if not both, must follow the cooperative phenomena model. Shifts in line position as a function of quench-induced supersaturation are shown. Lattice parameters of equilibrium and non-equilibrium phases are given. (Author)

AD-635 765 **Field 11F, 13H, 17A, 13J K**
CFSTI Prices: HC$1.00 MF$0.50
Naval Research Lab., Washington, D. C.
CORROSION AND CATHODIC PROTECTION OF UNDERWATER SURVEILLANCE SYSTEMS - A GENERAL REVIEW OF THE PROBLEM.
Memo rept.
by B. F. Brown, L. J. Waldron, and M. H. Peterson. Jun 63, 10p NRL-MR-1436
Proj. SR-007-08-11
Task 2829

Descriptors: (*Corrosion, Underwater equipment), (*Underwater equipment, *Cathodic protection), Deep submergence, Iron alloys, Nickel alloys, Copper alloys, Cobalt alloys, Titanium alloys, Aluminum alloys, Steel, Reviews, Liquid immersion tests, Sea water, Electrolysis, Corrosion inhibition.

A general review of the problem of corrosion of metallic assemblies for underwater surveillance is given, based on two years observing deep sea corrosion and on extensive technical discussions with personnel in contractors' plants and in Naval activities having cognizance over surveillance systems. Recommendations to minimize corrosion failures in such systems are given. (Author)

AD-635 829 **Field 11F, 20B**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.

COMPOUNDS OF THE RARE-EARTH METALS WITH ALUMINUM AND THEIR CRYSTALLINE STRUCTURES.
by P. I. Kripyakevich, and I. I. Zalutskii. 19 May 66, 7p FTD-HT-66-186
TT-66-61790
Unedited rough draft trans. of Akademiya Nauk SSSR. Institut Metallurgii, Trudy, 1964 p144-5.

Descriptors: (*Rare earth elements, *Aluminum alloys), (*Crystal structure, *Intermetallic compounds), Europium compounds, Lanthanum compounds, Cerium alloys, Praseodymium compounds, Neodymium alloys, Germanium alloys, Erium compounds, Samarium compounds, Dysprosium compounds, Gadolinium alloys, Scandium compounds.

The data of the investigation and of the existing literature allow certain conclusions to be made about the compositions of compounds of the rare-earth metals with aluminum. While the compounds RAl2 of the MgCu2 type exist in all systems, the compositions of the compounds richest in aluminum are not identical: their composition depends upon the atomic radii of the rare-earth metals. As the atomic radius decreases the RAl4 compounds (R = La, Ce, Pr, Nd) of the BaAl4 type give way to the RAl3 compounds (R = Sm, Ge, Er) with structures of the Mg3Cd or AuCu3 types, i.e., superlattices of the densest packing. Europium, whose atomic radius is larger than the radii of the neighboring elements, samarium and gadolinium, forms the compound EuAl4, which is isostructural to compounds of La, Ce, Pr and Nd. With respect to the values of the grid constant the compound EuAl4 is closer to the compound BaAl4 (a = 4.530 A, c = 11.14 A, c/a = 2.460) than to LaAl4 and its analogs (for which c/a = 2.31 - 2.32), which is connected with the similar atomic radii of Ba and Eu. In the systems of the rare-earth metals with shorter atomic radii the compounds RAl3 are close in composition and type of structure to the compounds HfAl3 and ScAl3.

AD-635 856 **Field 11F, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
METHODS OF TESTING METALS AND ALLOYS FOR CREEP AND VIBRATORY CREEP.
by L. T. Timoshuk, and A. A. Gudkov. 26 May 66, 26p FTD-HT-66-215
TT-66-61802
Unedited rough draft trans. of Tsentral'nyi Nauchno-Issledovatel'skii Institut Chernoi Metallurgii. Sbornik Trudov (USSR) n38 p123-35 1964.

Descriptors: (*Metals, Creep), (*Alloys, Creep), (*Creep, Test methods), USSR, Vibration, Test equipment, High-temperature research.

A stand and measuring apparatus was developed to study creep and vibratory creep in alloys E1726 and E1652. The initial sections of the curves of creep and vibratory creep were investigated for a test time up to 40 hours. The tests were conducted in conditions of a variable temperature and power regime. At test temperatures of 900C and 1000C under constant and changed regimes, upon imposition of a vibrational load alloy E1726 exhibited an increased rate of creep at the very start of the test (1-3 hours). After this the rates of creep and vibratory creep remained approximately identical. At any moment of time the absolute expansion under vibratory creep was greater than that under creep. The subposition noted in the literature about the possibility of changing the direction of the effect of vibration upon creep as the test temperature changes was confirmed. The imposition of vibration upon the static part of the load for alloy E1652 at 900 and 1000C cause opposite effects. In the first case vibration somewhat strengthened the alloy, and in the second case it significantly facilitated deformation.

AD-635 968 **Field 11F, 14D**
CFSTI Prices: HC$2.00 MF$0.50
Lockheed Missiles and Space Co., Palo Alto, Calif. Research Labs.
DETERMINATION OF TOLERABLE IMPERFECTIONS IN LIGHT METAL SHEET ALLOYS FOR AEROSPACE APPLICATIONS.
by Richard E. Lewis, and Elliott Willner. Jun 66, 35p Rept. no. 4-11-66-2
Presented at AIAA Aerospace Sciences Meeting (4th), Los Angeles, Calif., June 27-29 1966. paper no. 66-524.

Descriptors: (*Aluminum alloys, Defects (Materials)), (*Magnesium alloys, Defects (Materials)), (*Sheets, Tolerances (Mechanics)), Fracture (Mechanics), Surface properties.

Scratches, gouges, pits, and cracks found in high-strength aluminum and magnesium sheet alloy structural components used in highly stressed, light-weight aerospace structures often cause long and expensive delays in making an acceptance or rejection decision. This study was initiated to establish a useful basis for determining the effect of imperfections on gross fracture strength, thus minimizing time delays. The specimens used are 2 in. wide, 8 in. long, and of sheet thickness. A semi-elliptical groove with controlled depth and length is produced in the surface of each specimen at midlength, forming a plane perpendicular to the long dimension. A fatigue crack is generated at the base of the machined groove in each specimen. This fatigue precracked specimen is then tested to failure by uniaxial static tension or tensile fatigue. After failure, the original crack depth and length are measured. Gross and net section stresses and strain energy release rates are then calculated. These results provide quantitative bases for 'tolerable' imperfections. This information can be applied to inspection of as-received sheet material and structural components of aerospace structures. (Author)

AD-636 152 **Field 11F, 20M**
CFSTI Prices: HC$3.00 MF$0.75
Naval Air Engineering Center, Philadelphia, Pa. Aeronautical Materials Lab.
THE ROLE OF OXYGEN IN THE BRITTLE BEHAVIOR OF METALS.
Progress rept. no. 13, 1 Jul 65-31 Mar 66.
by Edwin S. Tankins. 21 Jun 66, 84p NAEC-AML (9)-R360FR101
Proj. NAEC-AML (9)-R360FR101
See also AD-430 831.

Descriptors: (*Oxygen, Liquid metals), (*Liquid metals, Oxygen), Solutions, Brittleness, Microstructure, Vapor pressure, Thermodynamics, Cobalt alloys, Copper alloys, Nickel alloys, Iron alloys, Chemical equilibrium, High-temperature research.

Contents: An examination of Henry's law in liquid metal systems with infinitely dilute solutions of oxygen; The thermodynamic properties of dilute solutions of oxygen in the liquid binary cobalt-copper alloys; The thermodynamic behavior of oxygen in liquid binary-metallic solvents - a simple solution model; The thermodynamic properties of dilute solutions of oxygen in the liquid binary Cu-Ni alloys.

BMI-1766 **Field 11F, 18J**
CFSTI Prices: HC$3.00 MF$0.50
Battelle Memorial Inst., Columbus, Ohio.
FISSION-FRAGMENT EFFECTS IN STRUCTURAL MATERIALS.
by John A. De Mastry, Robert L. Ritzman, Neal M. Griesenauer, and James L. Mc Call. 22 Mar 66, 53p
Contract W-7405-eng-92
EURAEC1631

Descriptors: (*Radiation damage, Metals), (*Metals, Radiation damage).

For abstract, see N 20 15.

BNWL-207 **Field 11F, 18J**
CFSTI Prices: HC$3.00 MF$1.00
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
METALLURGY RESEARCH SECTION, QUARTERLY PROGRESS REPORT, OCTOBER-DECEMBER 1965.
17 Jan 66, 143p
Contract AT (45-1)-1830

Descriptors: (*Metallurgy, Scientific research).

For abstract, see N 20 15.

NMI-1264 **Field 11F**
CFSTI Prices: HC$6.00 MF$1.25
Nuclear Metals, West Concord, Mass.
FUNDAMENTAL AND APPLIED RESEARCH AND DEVELOPMENT IN METALLURGY. II. FABRICATION OF SEAMLESS TUNGSTEN AND TUNGSTEN-RHENIUM TUBING.
Summary technical rept, 1 Jul 63-30 Jun 64.
by S. Isserow, J. G. Hunt, and R. G. Jenkins. 15 Jun 65, 249p
Contract AT (30-1)-2784
NYO2784-11

Descriptors: (*Material forming, Scientific research).

For abstract, see N 20 15.

N66-12249 **Field 11F**
CFSTI Prices: HC$1.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
A STUDY OF TUNGSTEN-TECHNETIUM ALLOYS.
Quarterly progress rept. 1 Jul-1 Oct 65.
Oct 65, 9p BNWL-162
Contract AT (45-1)-1830
NASA-CR-68105

Descriptors: *Fission product, *Porosity, *Technetium, *Metallurgy, Tungsten alloy.

N66-12264 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
General Electric Co., Cincinnati, Ohio. Space Power and Propulsion Section.
STUDIES OF ALKALI METAL CORROSION ON MATERIALS FOR ADVANCED SPACE POWER SYSTEMS.
Quarterly progress rept. no. 4, 26 Mar-26 Jun 65.
by R. W. Harrison. 1965, 47p
Contract NAS3-6012
NASA-CR-54476

Descriptors: *Mass transfer, *Stress corrosion, *Refractory material.

N66-14754 **Field 11F**
CFSTI Prices: HC$1.00 MF$0.50
General Electric Co., Cincinnati, Ohio. Space Power and Propulsion Section.
STUDIES OF ALKALI METAL CORROSION ON MATERIALS FOR ADVANCED SPACE POWER SYSTEMS.
Quarterly progress rept. no. 5, 26 Jun-26 Sep 65.
by R. W. Harrison. 1965, 25p
Contract NAS3-6012
NASA-CR-54844

Descriptors: *Potassium, *Niobium alloy, *Stress corrosion.

N66-14785 **Field 11F**
CFSTI Prices: HC$3.00 MF$0.50
General Electric Co., Cincinnati, Ohio. Space Power and Propulsion Section.
POTASSIUM CORROSION TEST LOOP DEVELOPMENT.
Quarterly progress rept. no. 8, 15 Apr-15 Jul 65.
by E. E. Hoffman. 23 Nov 65, 50p
Contract NAS3-2547
NASA-CR-54843

Descriptors: *Loop, *Refractory alloy, *Corrosion test, *Test equipment.

N66-14915 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
Westinghouse Electric Corp., Pittsburgh, Pa. Astronuclear Lab.
EVALUATION OF REFRACTORY/AUSTENITIC BIMETAL COMBINATIONS.
Quarterly progress rept. no. 1, 22 Jun-22 Sep 65.
by R. W. Buckman Jr, and J. L. Godshall. 1965, 37p WANL-PR (EE)-001
Contract NAS3-7634
NASA-CR-54834

Descriptors: *Bonding, *Explosive forming, *Mechanical property, *Refractory metal, *Physical property.

N66-14998 **Field 11F**
CFSTI Prices: HC$1.00 MF$0.50
Atomic Energy of Canada, Ltd., Chalk River (Ontario).
A TECHNIQUE FOR LOW TEMPERATURE HYDRIDING OF ZIRCONIUM ALLOYS.
by E. E. Sexton. Nov 65, 17p AECL-2511

Descriptors: *Gaseous diffusion, *Zirconium alloy, *Hydride.

N66-15079 **Field 11F**
CFSTI Prices: HC$1.00 MF$0.50
Comitato Nazionale per l Energia Nucleare, Rome (Italy).
INFLUENCE OF THE HEAT-TREATMENTS ON THE STRUCTURE OF URANIUM-RICH ALLOYS CONTAINING ZIRCONIUM.
by C. Fizotti, and A. Masperoni. Nov 64, 18p RT/MET/64/4

Descriptors: *Heat treatment, *Uranium alloy, *Zirconium alloy.

N66-15444 **Field 11F**
CFSTI Prices: HC$1.00 MF$0.50
Case Inst. of Tech., Cleveland, Ohio. Dept. of Metallurgy.
MODIFIED EUTECTIC ALLOYS FOR HIGH TEMPERATURE SERVICE. SIX MONTH PROGRESS REPORT.
by S. F. Ramseyer, and J. F. Wallace. Dec 65, 24p
Grant NsG-639
NASA-CR-69376

Descriptors: *High temperature material, *Nickel alloy, *Cobalt alloy, *Eutectic alloy, *Tungsten.

N66-15980 **Field 11F**
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
TENSILE BEHAVIOR OF SAME-LOT SINGLE-CRYSTAL AND POLYCRYSTALLINE TUNGSTEN FROM 2500 TO 5000 DEG F.
by J. L. Taylor. 15 Nov 65, 24p JPL-TR-32-827
Contract NAS7-100
NASA-CR-69653

Descriptors: *Single crystal, *Tungsten, *High temperature research, *Tensile strength.

N66-16193 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
Materials Research Lab., Inc., Richton Park, Ill.
ELEVATED TEMPERATURE STRESS CORROSION OF HIGH STRENGTH SHEET MATERIALS IN THE PRESENCE OF STRESS CONCENTRATIONS.
Final rept.
by R. L. Kirchner, R. G. Lingwall, R. P. Oshea, and E. J. Ripling. Nov 65, 47p
Contract NASr-50
NASA-CR-69851

Descriptors: *Stress corrosion, *Titanium alloy.

N66-17887 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
A THEORETICAL AND EXPERIMENTAL INVESTIGATION OF THE OXIDATION OF MOLYBDENUM AT TEMPERATURES AT WHICH ITS TRIOXIDE IS VOLATILE.
by D. R. Schryer, and G. D. Walberg. Mar 66, 42p
NASA-TR-R-232

Descriptors: *Molybdenum, *Volatility, *Trioxide.

N66-18150 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
Bologna Univ. (Italy) Istituto di Fisica.
WORK-HARDENING AND RECOVERY PHENOMENA IN ZIRCONIUM.
by A. Desalvo, P. Gondi, G. F. Missiroli, and F. Zignani. Dec 65, 32p EUR-2341.E
Contract EURATOM-051-62-11 RDI

Descriptors: *Recovery, *Electric resistance, *Electron microscopy, *Work hardening, *Zirconium.

N66-18410 **Field 11F**
CFSTI Prices: HC$4.00 MF$0.75
Manlabs, Inc., Cambridge, Mass.
DEVELOPMENT OF STRESS RELIEF TREATMENTS FOR HIGH STRENGTH ALUMINUM ALLOYS.
Annual rept. no. 2, 13 Aug 64-13 Aug 65.
by S. A. Kulin, and G. M. Orner. Sep 65, 101p
Contract NAS8-11091
NASA-CR-70590

Descriptors: *Aluminum alloy, *Metallurgy, *Stress relaxation, *Temperature effect.

N66-18482 **Field 11F**
CFSTI Prices: HC$1.00 MF$0.50
General Dynamics/Convair, San Diego, Calif.
PRELIMINARY INVESTIGATION OF LOW TEMPERATURE PHASE TRANSFORMATIONS IN AISI 301.
by C. J. Guntner. 13 Sep 63, 21p Rept. no. 10E-1671
Contract NAS3-3232
NASA-CR-54699

Descriptors: *Stainless steel, *Austenitic steel, *Phase transformation, *Structural failure, *Welded structure.

N66-18484 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
Vitro Labs., West Orange, N. J.
DEVELOPMENT OF A DISPERSION STRENGTHENED NICKEL BASE ALLOY USING THE HIGH INTENSITY ARC PROCESS.
Summary rept.
by S. Grand, and H. M. McCullough. 15 Dec 65, 50p
Contract NAS3-7275
NASA-CR-54518

Descriptors: *Dispersion hardening, *Electric arc, *Zirconium oxide, *Nickel alloy, *Thorium oxide.

ORNL-3831 **Field 11F, 18I, 18J**
CFSTI Prices: HC$6.00 MF$1.25
Oak Ridge National Lab., Tenn.
STATUS AND PROGRESS REPORT FOR THORIUM FUEL CYCLE DEVELOPMENT FOR PERIOD ENDING DECEMBER 31, 1964.
by R. G. Wymer, and D. A. Douglas Jr. May 66, 206p
Contract W-7405-eng-26

Descriptors: (*Reactor fuel rods, Thorium), (*Thorium, Reactor fuel rods).

For abstract, see N 20 15.

PB-170 631 **Field 11F, 7A**
CFSTI Prices: HC$1.50 MF$0.50
Bureau of Reclamation, Denver, Col. Chemical Engineering Branch.
USE OF POLARIZATION CURVES FOR NONDESTRUCTIVE CORROSION TESTING.
by T. E. Backstrom. 3 Jan 66, 20p ChE-35

Descriptors: (*Polarization, Corrosion inhibition), (*Corrosion, Non-destructive testing), (*Non-destructive testing, Corrosion), Electrochemistry, Steel.

Polarization curves provide a graphic picture of the electrochemical processes affecting the corrosion of a metal or alloy. The effect of various parameters can be quickly and concisely determined for a specific environment. The corrosion resistance of various metals and alloys toward a specific set of conditions can be evaluated in a practically nondestructive test. Polarization curves were used to determine the influence of chloride addition on the corrosion of steel in saturated Ca (OH)2 solution. Results indicate that small chloride concentrations are sufficient to overcome the protective environment established by the hydroxyl ions. Larger NaCl concentrations increase the corrosion rate until the reaction becomes cathodically controlled due to decreasing oxygen solubility in the test solutions or the oxygen diffusion becomes the rate controlling reaction. (Author)

PB-170 709 **Field 11F, 13H**
CFSTI Prices: HC$1.50 MF$0.75
Research Center of the Defence Forces, Helsinki (Finland).
THE EFFECT OF TEMPERING ON THE TOUGHNESS OF HARDENED STEEL.
Doctoral thesis.
by Juha Pietikainen. 1966, 80p
Thesis accepted by the Institute of Technology, Helsinki. Pub. in Acta Polytechnica Scandinavica, Ch. 47, Chemistry including Metallurgy series no. 47.

Descriptors: (*Steel, Tempering), (*Tempering, Steel), Toughness, Brittleness, Carbides, Deformation, Temperature, Microstructure, Finland.

A steel having the nominal analysis: 0.35% C, 1.5% Si, 20% Ni was chosen for the work. X-ray and electron microscopy studies revealed that in the tempering process, epsilon carbide appears in the structure when T (t) (tempering temperature) ±120 to 200C, and cementite when T (t)±or > 400C. The results seem to indicate the appearance of an as yet unknown carbide when T (t) = 250 to 375C. This carbide was found to deform plastically on torsion. Torsion test results demonstrated that: With increasing speed of rotation (n), a discontinuous decrease of the fracturing total twist occurs with the tempering temperatures T (t) = 190 and 310C, and a discontinuous increase with T (t) = 70C, when certain critical speeds of rotation are exceeded. The total twist of specimens tempered at T (t) = 430C decreases uniformly with increasing log n. At speeds higher than the critical speed of rotation, work softening occurs in the test bar. (Author)

RFP-706 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
A STUDY OF THE EFFECTS OF ADDITIVES ON SINTERED TUNGSTEN POWDER COMPACTS.
by C. E. Williams, and V. R. Friebel. 13 May 66, 27p
Contract AT (29-1)-1106

Descriptors: (*Powder metallurgy, Additives), (*Additives, Powder metallurgy).

For abstract, see N 20 15.

UCRL-14619 Field 11F
CFSTI Prices: HC$2.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
EFFECT OF STRAIN RATE AND SPECIMEN DIMENSIONS ON THE YIELD POINT OF MILD STEEL.
Master's thesis.
by Marvin A. Hamstad. 25 Apr 66, 46p
Contract W-7405-eng-48

Descriptors: (*Steel, Mechanical properties).

For abstract, see N 20 15.

UCRL-14752 Field 11F
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
DIFFUSION OF FE IN AN FE-AL ALLOY.
by D. Y. F. Lai, and R. J. Borg. 24 Mar 66, 5p
Contract W-7405-eng-48

Descriptors: (*Diffusion, Metals), (*Metals, Diffusion).

For abstract, see N 20 15.

UCRL-14805 Field 11F, 18J
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
MECHANICAL PROPERTIES OF GAMMA-PHASE URANIUM-7.5 NIOBIUM-2.5 ZIRCONIUM ALLOY UNDER DYNAMIC LOADING.
by K. G. Hoge. 6 Apr 66, 13p
Contract W-7405-eng-48

Descriptors: (*Reactor materials, Mechanical properties).

For abstract, see N 20 15.

AD-448 095 See Field 21E

AD-635 572 See Field 13H

AD-635 594 See Field 20K

AD-635 628 See Field 13H

AD-635 647 See Field 11C

AD-635 687 See Field 11C

AD-635 755 See Field 13H

AD-635 762 See Field 13J

AD-635 763 See Field 13J

AD-635 764 See Field 13J

AD-635 766 See Field 13J

AD-635 769 See Field 13J

AD-635 785 See Field 13J

AD-635 786 See Field 13J

AD-635 787 See Field 13J

AD-635 791 See Field 13J

AD-635 793 See Field 13J

AD-635 794 See Field 13J

AD-635 795 See Field 13J

AD-635 797 See Field 13J

AD-635 844 See Field 18J

AD-635 871 See Field 13J

AD-636 180 See Field 13H

AD-636 191 See Field 13H

AD-636 193 See Field 9A

AD-636 210 See Field 13H

AD-636 211 See Field 13H

AD-636 224 See Field 19D

BNWL-218 See Field 5B

GEMP-400A See Field 11B

PB-170 648 See Field 20B

WCAP-3385-53 See Field 18I

11G. MISCELLANEOUS MATERIALS

PB-170 426 Field 11G, 13B
CFSTI Prices: HC$1.50 MF$0.50
New York State Dept. of Public Works.
EVALUATION OF KINEMATIC VISCOSITY GRADES OF CUTBACK ASPHALT.
May 65, 14p Physical research rept. RR-65-4, 0145
Proj. 28
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. Rept. on Temperature-Viscosity Relationship of Asphalt, phase 1.

Descriptors: (*Roads, Asphalt), (*Asphalt, Viscosity), Mechanics, Classification, Specifications, Civil engineering, Surfaces, Stabilization, Effectiveness.

Identifiers: Evaluation.

A limited field study was conducted in 1963 to determine if the New York State Department of Public Works then current method of classifying cutback asphalts by Saybolt-Furol viscosity could be replaced by the newer Kinematic viscosity system. Two of the new medium-curing grades and one rapid-curing grade were used for surface treatment of stabilized shoulders. One medium curing grade was used for mixed-in-place shoulder stabilization. Control sections of the old grades that were similar in viscosity to the new were installed for each of the four projects. Performance during application was observed and reported. From the study it was concluded that cutback asphalts meeting the new kinematic viscosity specifications performed as well as those supplied under the old system. The Department subsequently adopted the kinematic viscosity classification for cutback asphalts. (Author)

PB-170 429 See Field 13B

PB-170 430 See Field 13M

11H. OILS, LUBRICANTS, AND HYDRAULIC FLUIDS

AD-479 930 Field 11H
CFSTI Prices: HC$6.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
ABRASION BY LAMELLAR SOLID LUBRICANTS.
Technical rept.
by J. K. Lancaster, and Patricia A. Grattan. Jan 66, 31p TR-66012

Descriptors: (*Lubricants, Abrasives), Graphite, Molybdenum compounds, Sulfides, Boron compounds, Nitrides, Powders, Crystal structure, Great Britain.

Identifiers: Dry-film lubricants, Boron nitride, Molybdenum disulfide.

The extent to which lamellar solid lubricants (graphite, MoS2, BN, etc) are abrasive was determined by measuring the rate of wear of phosphor-bronze sliding against PTFE in the presence of the powdered solid. Dispersions in silicone fluid are preferable to dry powder in order to avoid complicating effects due to transfer of the solid lubricant to the sliding surfaces. There are significant differences in the abrasiveness of samples of MoS2 conforming to standard specifications and it is suggested that the major factor responsible is the degree of perfection of the crystal structure. This aspect is particularly important for boron nitride and may largely account for its inability to function as an effective solid lubricant. (Author)

AD-482 416 Field 11H, 7C
CFSTI Prices: HC$1.50 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
A NOTE ON THE HIGH-TEMPERATURE OXIDATION OF CHLOROPHENYLMETHYL SILICONE FLUIDS.
Technical rept.
by G. H. Kinner. Jan 66, 20p TR-66011

Descriptors: (*Hydraulic Fluids, Siloxanes), (*Siloxanes, Oxidation), Heat-resistant materials, Silicone plastics, Metals, Halogenated hydrocarbons, Chlorine compounds, Great Britain.

Identifiers: Chlorophenyl methyl siloxanes.

The results of oxidation tests at a temperature of 250C are described for two chlorophenylmethyl silicones intended for use as high-temperature aircraft hydraulic fluids. It is shown that the extent and mode of oxidation may be significantly affected by the presence of bulk metals. (Author)

AD-635 838 Field 11H
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
STABILIZATION OF POLYSILOXANES BY ANTIOXIDANT ADDITIVES.
by R. I. Kobzova, and G. S. Tubyanskaya. 25 May 66, 12p FTD-TT-65-1845
TT-66-61797
Unedited rough draft trans. of Khimiya i Tekhnologiya Topliv i Masel (USSR) n9 p53-6 1964.

Descriptors: (*Siloxanes, *Antioxidants), (*Lubricant Additives, *Quinones), Lubricants, Thermal stability, Silicone plastics, Concentration (Chemistry), Amines, Azines, Phenols, Polycyclic compounds, Metalorganic compounds, USSR.

Identifiers: Dimezidin anthraquinone, Polymethysiloxanes.

It was established that the most effective antioxidation additive to polyimethyl-siloxane oil (PMS-100) at the temperatures 250, 300 and 350C, proves to be 1.4-dimezidin-anthraquinone, the introduction of which in the amount of 0.5% improves the thermooxidation stability of PMS-100 at 300C by a factor of 16 and at 250C by a factor of 44. It was shown, that for some additives, the effectiveness of action with increasing concentration goes through a maximum, and the use of them above 3.0% is not feasible. (Author)

N66-15497 Field 11H
CFSTI Prices: HC$4.00 MF$0.75
Republic Aviation Corp., Farmingdale, N. Y.
EVALUATION OF HYDRAULIC FLUIDS FOR USE IN ADVANCED SUPERSONIC AIRCRAFT.
Semiannual rept. no. 1.
by F. Damasco. 14 Oct 65, 111p FHR-2701-1
Contract NAS3-7263
NASA-CR-54492

Descriptors: *Hydraulic fluid, *Mineral oil, *Polyphenyl ether, *Fluorocarbon, *Silicone, *Supersonic aircraft.

For abstract, see T 66 17.

11I. PLASTICS

AD-635 669 **Field 11I, 20M**
CFSTI Prices: HC$1.00 MF$0.50
Picatinny Arsenal, Dover, N. J. Plastics and Packaging Lab.
THERMAL DEGRADATION OF TEFLON.
Technical rept.
by Samuel H. T. Lee, Henry Will III, and David W. Levi. Jul 66, 26p
Proj. DA-1A014501B13A
PA-TR-3321

Descriptors: (*Halocarbon plastics, Degradation), Thermal analysis, Heat of activation, Differentiating circuits, Gravimetric analysis.

A differentiator circuit for use with TGA instrumentation was modified and found to be satisfactory with Teflon. The studies on Teflon indicated that the degradation of this polymer is probably close to first order over the entire temperature range. In addition, no evidence was found for any marked changes in activation energy with conversion in the degradation of this polymer. (Author)

AD-635 788 **Field 11I, 21I**
CFSTI Prices: HC$2.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y.
EXTENSIONAL MECHANICAL PROPERTIES OF POLYESTER AND POLYETHER BASED POLYURETHANES.
Research rept.
by Jerome M. Klosner, Alexander Segal, and Howard N. Franklin. Jun 66, 50p PIBAL-922
Contract Nonr-839 (32) (FBM), Grant NSF-GP-1246
Proj. NR-064-457

Descriptors: (*Isocyanate plastics, Mechanical properties), (*Solid rocket propellant binders, Mechanical properties), Polyester plastics, Ethers, Polymers, Deformation, Modulus of elasticity, Relaxation time, Viscoelasticity.

Identifiers: Elongation, Polyethers.

An investigation of the extensional mechanical properties of a polyester based polyurethane and a polyether based polyurethane is described. Dynamic steady-state tests were performed over a frequency range of 1000 to 8000 cps and a temperature range of 50 to 110F for the polyester material held at a constant elongation of 105%. The experiments on the polyether were conducted at 110% initial elongation over a range of frequency of 200 to 1600 cps, and a temperature range of 50 to 110F. The complex modulus is found for both materials and the reduced variable concept applied. Master curves for the moduli are determined for a reference temperature of 510R (50F). Relaxation tests were performed on the same materials and the relaxation modulus determined. The relaxation spectrum is determined by using the data from the dynamic and relaxation experiments. (Author)

AD-635 799 **Field 11I**
CFSTI Prices: HC$2.00 MF$0.50
Plastics Technical Evaluation Center, Picatinny Arsenal, Dover, N. J.
DIELECTRIC PROPERTIES OF POLYMERS. A BIBLIOGRAPHY.
Report for 1955-1966.
by David W. Levi, and Dorothy A. Teetsel. May 66, 34p Plastec note-12

Descriptors: (*Plastics, *Dielectric properties), Bibliographies, Solutions, Cellulosic plastics, Polyethylene plastics, Vinyl plastics, Halocarbon plastics, Polyester plastics, Epoxy plastics, Polyamide plastics.

Identifiers: Polyethers.

A bibliography of 216 items is reported on the dielectric properties of polymers. It is limited to the references in the author's personal file. However, these cover the significant journals in the field, for the years 1955-1966. Complete subject and author indexes are included for the convenience of the user. (Author)

AD-636 141 **Field 11I, 7C**
CFSTI Prices: HC$2.00 MF$0.50
Picatinny Arsenal, Dover, N. J. Plastics and Packaging Lab.
HALOGENATED EPOXY TYPE RESINS. I. PREPARATION AND DETERMINATION OF STRUCTURE OF HALOGENATED BISPHENOL-TYPE COMPOUNDS.
Technical rept.
by Walter J. Erich, Frederick S. Holahan, and Richard J. Valles. Jul 66, 29p
Proj. DA-1C014501B13A
PA-TR-3328

Descriptors: (*Epoxy plastics, Synthesis (Chemistry)), (*Halogenated hydrocarbons, Synthesis (Chemistry)), (*Phenols, Halogenation), Halocarbon plastics, Bromine compounds, Chlorine compounds, Fluorine compounds, Acetones, Chemical analysis, Nuclear magnetic resonance, Spectra (Infrared), Melting point, Molecular structure, Chemical bonds, Heat-resistant plastics.

Identifiers: Bisphenols.

The tetrabromo and tetrachloro derivatives of three parent compounds-bisphenol A, hexafluoroacetone bisphenol, and tetrafluorodichloroacetone bisphenol were prepared. Elemental analyses were good in general and strongly indicated that the compounds were tetrahalogenated. Nuclear magnetic resonance studies proved that the compounds contained four symmetrical halogens. Infrared studies conclusively proved, by analogy with known model compounds, that the halogens were in the 2,6 rather than the 3,5 position. The melting points of the tetrabromo derivatives were, in general, considerably higher than those of the parent compounds, but in two instances the tetrachloro derivatives gave lower readings than the parent compounds. The reason for this difference is not known. (Author)

N66-14964 **Field 11I**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Research Inst., Menlo Park, Calif.
A STUDY OF BONDING BETWEEN GLASS AND PLASTIC IN GLASS-REINFORCED PLASTICS. PHASE II.
Quarterly progress rept. no. 6, 1 May - 31 Jul 65.
by D. L. Chamberlain Jr. 13 Oct 65, 22p Rept. no. 7
Contract NASr-49 (14)
NASA-CR-69199

Descriptors: *Glass, *Reinforced plastic, *Silicon polymer, *Alkylation, *Bonding.

For abstract, see T 66 17.

N66-15443 **Field 11I**
CFSTI Prices: HC$2.00 MF$0.50
Stanford Research Inst., Menlo Park, Calif.
A STUDY OF BONDING BETWEEN GLASS AND PLASTIC IN GLASS-REINFORCED PLASTICS, PHASE II.
Summary technical rept. no. 2, 1 Nov 64-31 Oct 65.
by D. L. Chamberlain Jr. 15 Nov 65, 46p Rept. no. 8
Contract NASr-49 (14)
NASA-CR-69385

Descriptors: *Bonding, *Plastic material, *Reinforced plastic, *Glass, *Inorganic compound.

AD-468 940 **See Field 7C**

AD-635 586 **See Field 7D**

AD-635 655 **See Field 18D**

AD-636 100 **See Field 11A**

AD-636 271 **See Field 20K**

11J. RUBBERS

AD-469 936 **Field 11J**
CFSTI Prices: HC$1.60 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
LIMITATIONS OF THE TOBOLSKY 'TWO NETWORK THEORY' IN THE INTERPRETATION OF STRESS-RELAXATION DATA IN RUBBERS.
by D. K. Thomas. Jun 65, 18p Technical rept. TR-65132

Descriptors: (*Synthetic rubber, Stresses), Aging (Materials), Relaxation time, Vulcanizates, Degradation, Great Britain, Fluorine compounds, Organic solvents, Chemical bonds, Strain (Mechanics), Peroxides, Rubber.

Experiments have been devised which reveal serious shortcomings in the accepted method of interpreting the results of continuous and intermittent stress-relaxation measurements in terms of the Tobolsky 'two network theory'. In general the heat aging of rubbers is a complex process and there is a high probability that the results of stress-relaxation measurements will not be amenable to analysis by the 'two network theory'.

AD-636 217 **See Field 7C**

11K. SOLVENTS, CLEANERS, AND ABRASIVES

AD-482 753 **Field 11K, 7C**
CFSTI Prices: HC$6.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
THE IDENTIFICATION AND ORIGIN OF THE VOLATILE COMPONENTS OF A FRESHLY MILLED MIXTURE OF NITROSO RUBBER AND CARBON BLACK.
Technical rept.
by J. L. Cotter, and G. J. Knight. Feb 66, 14p TR-66041

Descriptors: (*Synthetic rubber, Vapors), (*Organic nitrogen compounds, Synthetic rubber), Carbon black, Halogenated hydrocarbons, Fluorine compounds, Amines, Chemical reactions, Spectrum (Infrared), Mass spectrum, Great Britain.

Identifiers: Nitroso rubber.

Bis (trifluoromethyl)amine and perfluoro (methylmethyleneamine) were positively identified in the volatiles obtained from a freshly milled mixture of nitroso rubber and carbon black, and it is highly probable that trifluoromethyl isocyanate was also present. Likely schemes for the formation of these products are proposed. (Author)

AD-636 279 **Field 11K, 11C**
CFSTI Prices: HC$1.00 MF$0.50
Naval Air Engineering Center, Philadelphia, Pa. Aeronautical Materials Lab.
THE USE OF THE HYDROGEN PERMEATION APPARATUS TO EVALUATE PAINT STRIPPING COMPOUNDS.
by Edward Taylor. 8 Jun 66, 4p NAEC-AML-2469
Task RRMA-02-001/2001/R007-01-01

Descriptors: (*Paint removers, Test equipment), Hydrogen, Permeability, Instrumentation, Effectiveness, Cadmium, Rings, Hydrogen embrittlement, Test methods.

Based on the experimental work described in the report, the following conclusions were made: (1) The hydrogen permeation apparatus was not significantly more sensitive to hydrogen produced by the paint strippers than the Lawrence Hydrogen Detection Gauge although the permeation specimen was exposed only 10 minutes whereas the probe was exposed 6 hours. (2) While not reproducible to the degree desired, the Lawrence Gauge is, at present, easier to use with paint strippers than the permeation apparatus and about 4 times as many tests can be made in the same period of time (1 day). (3) The presence of a cadmium deposit on the metal surface greatly increases the production of hydrogen when the aggressive strippers are applied. (4) The use of notched high strength C-rings is still a reliable way of evaluating the embrittling characteristics of chemical treatments. (5) If a process causes deleterious effects by means other than hydrogen embrittlement, as may well be in the case of paint strippers, then a specimen such as the notched C-ring, which simulates service conditions, would be a better choice than the instrumental methods described. (Author)

PB-169 581 **Field 11K, 8G**
CFSTI Prices: HC$6.00 MF$0.50
Brown and Root, Inc., Houston, Tex.
RESPONSE OF A NONLINEAR DAMPED OSCILLATOR TO RANDOM EXCITATION.
by A. W. Bell, and A. E. Galef. 1965, 15p
Rept. on Proj. MOHOLE. Subcontracted to National Engineering Science Co., Houston, Tex. Supported by National Science Foundation.

Descriptors: (*Oscillation, Damping), (*Well logging, Feasibility studies), Nonlinear systems, Probability, Distribution, Statistical analysis, Vibration.

Identifiers: MOHOLE Project.

A method for determining the response to random excitation of a simple oscillator with nonlinear damping is developed. As is always the case in random motion, the response is determined in terms of the root-mean-square response and the probability distribution. The probability distribution is found to be markedly different, in the nonlinear case, from the Rayleigh distribution found for the linear case. The effects on the probability of failure of an oscillator may therefore be quite profound even when the means-square response of the nonlinear oscillator is the same as the response of a otherwise equivalent linear oscillator. (Author)

11L. WOOD AND PAPER PRODUCTS

PB-170 396 **Field 11L**
CFSTI Prices: HC$6.00 MF$0.50
Forest Products Lab., Madison, Wis.
PARAMETERS FOR PREDICTING MAXIMUM SURFACE TEMPERATURES OF WOOD IN EXTERIOR EXPOSURES.
by E. M. Wengert. May 66, 19p Research paper FPL-62

Descriptors: (*Wood, Surface temperatures), Solar radiation, Reflection, Paint, Adhesives.

Accurate predictions of maximum temperatures of wood products in exterior exposures have been of great interest to industries that manufacture the wood products or provide finishes or adhesives for them. The report presents information in tables, maps, and diagrams that can be used to predict maximum surface temperatures without lengthy or involved calculations. (Author)

PB-170 407 **Field 11L, 2F**
CFSTI Prices: HC$6.00 MF$0.50
Forest Products Lab., Madison, Wis.
ANNUAL REPORT OF RESEARCH AT THE FOREST PRODUCTS LABORATORY, FPL 1965.
1965, 53p

Descriptors: (*Wood, Industrial research), Forestry, Construction, Materials.

This report presents summaries of research progress at FPL under five main headings corresponding to the names of its five technical research divisions: Wood Engineering Research; Wood Quality Research; Wood Fiber Products Research; Wood Chemistry Research; and Solid Wood Products Research.

PB-170 409 **Field 11L**
CFSTI Prices: HC$4.00 MF$0.50
Forest Products Lab., Madison, Wis.
PHYSICAL AND MECHANICAL PROPERTIES OF MOLUCCA ALBIZZIA GROWN IN HAWAII.
Research paper,
by C. C. Gerhards. Mar 66, 10p FPL-55

Descriptors: (*Trees, Mechanical properties), (*Hawaii, Trees), (*Wood, Mechanical properties), Physical properties, Weight, Density, Bending, Compressive properties, Hardness, Toughness.

Identifiers: Albizia falcata, Specific gravity.

Physical and mechanical properties of the wood species Molucca albizzia (Albizia falcata) grown in Hawaii, were determined in studies conducted at the U.S. Forest Products Laboratory. Results show this species to be light in weight (specific gravity is 0.32 for green wood and 0.33 for air-dry). It is moderately weak in bending and compressive strength, moderately soft, and moderately limber; however, for its specific gravity, the wood has normal shrinkage but has above average strength, hardness, and stiffness. (Author)

PB-170 604 **Field 11L, 11C, 7E**
CFSTI Prices: HC$3.00 MF$0.75
Forest Products Lab., Madison, Wis.
SURFACE CHARACTERISTICS OF WOOD AS THEY AFFECT DURABILITY OF FINISHES. PART I. SURFACE STABILIZATION. PART II. PHOTOCHEMICAL DEGRADATION OF WOOD.
Research paper,
by Harold Tarkow, Carole F. Southerland, Raymond M. Seborg, and Martin A. Kalnins. Mar 66, 63p FPL-57

Descriptors: (*Wood, Surface properties), (*Finishes + finishing, Wood), Stabilization, Additives, Phenolic resins, Strain (Mechanics), Humidity, Plastic coatings, Isocyanate plastics, Acrylic resins, Ultraviolet radiation, Radiation damage, Degradation, Vapors, Chemical properties, Photochemistry.

The report considers the behavior of wood surfaces in exterior exposures with the object of improving the durability of clear finishes applied over them. Surface stabilization of wood was examined as a means for reducing strains to the covering film that are caused by movement of the wood substrate as humidity conditions change. Improved performance of a polyurethane and a polyacrylate emulsion finish were observed on wood surfaces that had been given various degrees of stabilization with a phenolic resin. The effect of light on wood was also studied. Exposure of wood to ultraviolet light caused the formation of volatile products of degradation. Changes in the chemical properties of the wood were also noted. The rate of formation of the volatile products was useful in evaluating the effectiveness of treatments designed to protect wood from degradation by light. (Author)

PB-170 606 **Field 11L, 2F**
CFSTI Prices: HC$4.00 MF$0.50
Forest Products Lab., Madison, Wis.
ESTIMATING TREE SPECIFIC GRAVITY OF MAINE CONIFERS.
Research paper,
by Harold E. Wahlgren, Arthur C. Hart, and Robert R. Maeglin. Apr 66, 25p FPL-61

Descriptors: (*Maine, Trees), (*Trees, Physical properties), (*Wood, Density), Forestry, Sampling, Tensile properties, Machinability.

Identifiers: Specific gravity.

To use the specific gravity of a breast height increment core in estimating the average specific gravity of the merchantable portions of a tree, regression equations were developed for eight coniferous species in Maine. At slight additional cost, the precision of the estimates can be increased, markedly for some species, by including other measurable tree characteristics. The trend in specific gravity with height in stem is shown--each species exhibiting a characteristic pattern. (Author)

PB-170 625 **Field 11L, 13M**
CFSTI Prices: HC$6.00 MF$0.50
Forest Products Lab., Madison, Wis.
PANELING AND FLOORING FROM LOW-GRADE HARDWOOD LOGS.
Research note.
by B. G. Heebink, and K. C. Compton. Mar 66, 26p FPL-0122

Descriptors: (*Wood, Processing), (*Panels (Structural), Wood), (*Floors, Wood), Manufacturing methods, Drying, Machining, Packaging.

From small, low-grade hardwood logs, the Forest Products Laboratory has developed an experimental wall paneling that is equally suitable for flooring. Short cutoffs of the panel material can also be utilized as parquet block flooring. One of the keys is packaging this material in standard-size bundles. (Author)

PB-170 626 **Field 11L, 13D**
CFSTI Prices: HC$3.80 MF$0.50
Forest Products Lab., Madison, Wis.
EFFECT OF LOADING RATE ON THE EDGEWISE COMPRESSIVE STRENGTH OF CORRUGATED FIBERBOARD.
Research note.
by R. C. Moody, and J. W. Koning Jr. Apr 66, 14p FPL-0121

Descriptors: (*Fiberboard, Compressive properties), Tensile properties, Loading (Mechanics), Containers, Materials.

Identifiers: Corrugated construction.

Research was conducted to determine the effect of loading rate on the edgewise compressive strength of corrugated fiberboard. Results indicated that as the loading rate was increased the edgewise compressive strength, parallel to the flutes, also increased. Loads were found to be a logarithmetric function of the loading rate and increased approximately 7.5 percent for each tenfold increase in loading rate. (Author)

AD-636 260 **See Field 11A**

PB-169 964 **See Field 5C**

PB-170 297 **See Field 5C**

PB-170 744 **See Field 13B**

12A. MATHEMATICS AND STATISTICS

AD-430 612 **Field 12A, 1A**
CFSTI Price: HC$6.00
RAND Corp., Santa Monica, Calif.
ANOTHER COMPUTATIONAL APPROACH TO A MATHEMATICAL MODEL OF TURBULENCE.

by S. P. Azen, R. Bellman, and J. M. Richardson.
Jan 64, 14p RM-3918-ARPA
Contract SD-79, ARPA Order-189-61

Descriptors: (*Turbulence, Mathematical models), (*Programming languages, Nonlinear differential equations), Numerical analysis, Partial differential equations, Programming (Computers).

The nonlinear equations of turbulence are studied by approximation techniques. Computational methods to the solution of the model equation of Burgers are investigated. The application of a difference algorithm is studied. Numerical results obtained from a FORTRAN program are given. (Author)

AD-453 476 **Field 12A, 3A, 4A**
CFSTI Price: HC$1.50
RAND Corp., Santa Monica, Calif.
ON THE IDENTIFICATION OF SYSTEMS AND THE UNSCRAMBLING OF DATA-II: AN INVERSE PROBLEM IN RADIATIVE TRANSFER.
by R. Bellman, H. Kagiwada, R. Kalaba, and S. Ueno. Nov 64, 10p RM-4332-ARPA
ARPA Order-189-61
See also AD-607 461.

Descriptors: (*Planetary atmospheres, Analysis), (*Solar radiation, Reflection), Diffusion, Upper atmosphere, Physical properties, Numercial methods + procedures.

Identifiers: Invariant imbedding, Quasilinearization.

The advent of artificial satellites makes it desirable to be able to use measurements of the angular dependence of diffusely reflected sunlight from a planetary atmosphere to deduce the physical properties of the atmosphere. It is shown that a combination of invariant imbedding and quasilinearization may be used for this purpose. Some illustrative numerical results are provided. (Author)

AD-460 305 **Field 12A, 9B**
CFSTI Price: HC$4.00
Ballistic Research Labs., Aberdeen Proving Ground, Md.
A METHOD FOR INVERTING LARGE MATRICES OF SPECIAL FORM.
by Palmer R. Schlegel. Dec 64, 20p BRL-MR-1624
Proj. RDT/E-1P014501A14B

Descriptors: (*Matrix algebra, Programming (Computers)), Algorithms.

The procedure for inverting matrices of special form has resulted in a direct, elementary method for obtaining such inverses. This method is easily adapted for computer usage, where storage is always a problem in the construction of an inverse matrix of large order. A particular advantage is that, relative to the order of the matrix, only a small amount of information has to be retained in the computation of the elements of the inverse. (Author)

AD-468 752 **Field 12A**
CFSTI Prices: HC$3.80 MF$0.75
Northwestern Univ., Evanston, Ill. Dept. of Geography.
MODELS FOR SPATIAL DIFFUSION RESEARCH. A REVIEW.
by Lawrence Brown. Jun 65, 73p Technical rept. TR-3
Contract Nonr-1228 (33)
Task 389-140

Descriptors: (*Geography, Mathematical models), (*Biophysics, Monte Carlo method), Epidemiology, Population, Sociometrics, Stochastic processes, Differential equations, Logistics, Distribution, Diffusion, Graphics.

The tradition of spatial diffusion research by geographers has been enriched in recent years by exploiting and developing a quantitative methodology. Generally, however, these efforts have not made use of the results of spatial diffusion research conducted by other disciplines, especially those outside of the social sciences. The purpose of this paper, then, is to illustrate and critically examine some of this other work: specifically, epidemiology models, logistic curve models, random and biased net models, random plane network models, and the theory embodied by each. In order to provide a constant reference point, a spatial diffusion model by the geographer Hagerstrand is also considered. In the course of the review, the utilities of each model are assessed, notions which might be useful for future research are extracted, and improvements to current research methodology are suggested. This report also suggests some modifications for a distance biased net model and presents the results of some limited experiments with the random plane network model. (Author)

AD-476 443 **Field 12A, 9B, 5A**
CFSTI Prices: HC$1.50 MF$0.75
Massachusetts Inst. of Tech., Cambridge. Dept. of Metallurgy.
MAP: A SYSTEM FOR ON-LINE MATHEMATICAL ANALYSIS.
by Roy Kaplow, Stephen L. Strong, and John W. Brackett. Jan 66, 106p MAC-TR-24
Contract Nonr-4102 (01)
Proj. NR-048-189

Descriptors: (*Man-machine systems, Programming (Computers)), (*Mathematical analysis, Man-machine systems), Computers, Numerical analysis, Instruction manuals, Programming languages.

Identifiers: MAP programming language, On-line systems, Time-sharing (Computers).

MAP has been developed for use within the M.I.T. Compatible Time Sharing System. Taking advantage of the varied user-machine interactions which are possible, MAP provides a facility for handling complex analyses, data input and presentation of results without requiring any computer programming by the user. This report is a description of the language and a self-teaching user manual; it does not describe the techniques used to implement the system. When given incomplete requests, the system will provide instructions regarding the use of its procedures and will ask for all the parameters, values and option decisions which may be required. If the requests are correct and sufficiently detailed, the computer will proceed directly to the calculations and, on command, present the results in graphical or typewritten form. Provisions have also been included to allow the expansion and personalization of the system in whatever manner is desired by individual users. (Author)

AD-635 574 **Field 12A**
CFSTI Prices: HC$6.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
COMPLETE RADIAL VARIATION OF ONE CLASS OF HARMONIC FUNCTIONS.
by V. S. Zakharyan, and E. O. Nazaryan. 1966, 13p ACIC-TC-1073
TT-66-61777
O Polnoi Radialnoi Variatsii Odnogo Klassa Garmonicheskikh Funktsii, trans. of Akademiya Nauk Armyanskoi SSR, Erevan. Doklady v41 n2 p65-72 1965.

Descriptors: (*Potential theory, *Measure theory), Convex sets, USSR.

For abstract, see T 66 17.

AD-635 591 **Field 12A, 18K**
CFSTI Prices: HC$3.00 MF$0.50
Naval Ordnance Lab., White Oak, Md.
A FINITE DIFFERENCE METHOD FOR GENERALIZED RADIAL TRANSPORT EQUATIONS.
by Avron Douglis. 21 Jun 66, 53p Mathematics Dept-M-64, NOLTR-66-130
Task FR-30

Descriptors: (*Boundary value problems, *Difference equations), (*Integral equations, *Neutron transport theory), Nuclear reactors, Thermal reactors.

Identifiers: Bare reactor.

A mode of calculation is justified for the solutions of generalized radial transport equations with initial and boundary conditions appropriate to a bare reactor. (Author)

AD-635 619 **Field 12A**
CFSTI Prices: HC$3.00 MF$0.75
Purdue Univ., Lafayette, Ind. Dept. of Statistics.
ON SELECTION AND RANKING PROCEDURES AND ORDER STATISTICS FROM THE MULTINOMIAL DISTRIBUTION.
by Shanti S. Gupta, and Klaus Nagel. Jun 66, 66p Mimeograph Series-77
Contract AF 33 (657)-11737

Descriptors: (*Statistical distributions, *Decision theory), Probability, Selection, Multivariate analysis.

Identifiers: Order statistics.

For abstract, see T 66 17.

AD-635 658 **Field 12A**
CFSTI Prices: HC$3.00 MF$0.75
Illinois Univ., Urbana.
GENERALIZED SUBSCALAR OPERATORS.
Doctoral thesis (Technical).
by Stephen Plafker. Apr 66, 65p
Contract DA-31-124-ARO (D)-288
Proj. DA-20014501B14C
AROD-5254:9

Descriptors: (*Operators (Mathematics), Theory), Integral transforms, Functional analysis, Invariance, Topology, Complex numbers, Real numbers, Mapping (Transformations).

Identifiers: Theses.

This paper treats a topic in generalized subscalar operators. Operator theory has been generalized from integral operators in Hilbert space to scalar and subscalar operators in Banach and other abstract spaces. In this paper some operators introduced by Maeda, using an operational calculus instead of integral representations, are restricted to certain invariant subspaces, and results analogous to some of C. Ionescu Tulcea's are among those obtained. An important theorem gives conditions for a minimal dilation of a continuous linear mapping. (Author)

AD-635 674 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Purdue Univ., Lafayette, Ind. Dept. of Statistics.
WAITINGTIMES BETWEEN RECORD OBSERVATIONS.
Technical rept.
by Marcel F. Neuts. Jul 66, 8p Mimeographic Series-79
Contract Nonr-1100 (26)

Descriptors: (*Queueing theory, *Stochastic processes), Statistical distributions.

If delta sub r denotes the waitingtime between the (r-1)st and the rth upper record in a sequence of independent, identically distributed random variables with a continuous distribution, then it is shown that delta sub r satisfies the weak law of large numbers and a central limit theorem. This theorems supplement those of Foster and Stuart and Renyi, who investigated the index V sub r of

the rth upper record. Qualitatively the theorems establish the intuitive fact that for higher records, the waitingtime between the last two records outweighs even the total waitingtime for previous records. This explains also why the asymptotic normality of log V sub r is very inadequate for approximation purposes-Barton and Mallows. (Author)

AD-635 688 **Field 12A, 5A**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
AN EXTENSION OF PALM'S THEOREM FOR (M G s) QUEUES TO THE CASE WHERE SERVICE RATES ARE DEPENDENT ON THE NUMBER OF BUSY CHANNELS.
by Craig C. Sherbrooke. Jul 66, 10p P-3406

Descriptors: (*Queueing theory, *Inventory analysis), Stochastic processes.

Identifiers: Palm's theorem.

An s channel queueing facility is considered where arrivals are Poisson. When all s channels are busy subsequent arrivals are lost. There is one arbitrary service distribution applicable to all channels, but the service rate is dependent on the number of busy channels. It is shown that the steady state probabilities are those which would be obtained under the assumption of exponential service. The model is related to an inventory problem with expediting. (Author)

AD-635 689 **Field 12A, 20J**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
HITTING TIMES FOR TRANSIENT STABLE PROCESSES.
by Sidney C. Port. Jul 66, 14p RM-5004-PR
Contract AF 49 (638)-1700

Descriptors: (*Stochastic processes, *Brownian motion), Probability, Set theory.

An investigation is made of the probability that a particle moving according to the laws of a transient stable process has not yet visited a specified subset of states. (Author)

AD-635 690 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Purdue Univ., Lafayette, Ind. Dept. of Statistics.
ON MAXIMUM VALUES IN CERTAIN APPLIED STOCHASTIC PROCESSES.
Technical rept.
by Marcel F. Neuts. Jun 66, 15p Mimeographic Series-74
Contract Nonr-1100 (26)

Descriptors: (*Stochastic processes, *Queueing theory), Model theory.

For abstract, see T 66 17.

AD-635 732 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
EXPONENTIAL REPRESENTATIONS OF MATRIX GROUPS.
by Dominic G. B. Edelen. May 66, 13p RM-5010-PR
Contract AF 49 (638)-1700

Descriptors: (*Matrix algebra, *Groups (Mathematics)), Complex numbers, Equations.

Almost all linear problems in engineering and physics can be cast in terms of matrices C which satisfy a system of conditions such as C t G C = G, G = a given nonsingular matrix. If G happens to be the identity matrix, then C is an orthogonal matrix, whose properties are well known. If, on the other hand, G is some odd-ball nonsingular matrix that arises in a problem with quixotic fixation, the C-matrices can have strange properties indeed. This note provides a direct method of obtaining the properties of such C-matrices by giving an explicit algebraic representation in exponential form. This form has been chosen since it reduces the required calculations to a minimum. (Author)

AD-635 880 **Field 12A, 20D**
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
NUMERICAL SOLUTION OF THE EQUATIONS OF THE 'ONE-PARAMETER' BOUNDARY-LAYER THEORY.
by L. M. Simuni, and N. M. Terentev. 15 Jun 66, 7p TG-230-T481
Contract NOw-62-0604-c
TT-66-61730
Trans. of Politekhnicheskii Institut, Leningrad. Trudy (USSR) n248 p56-8 1965.

Descriptors: (*Numberical analysis, *Partial differential equations), (*Boundary layer, Theory), Boundary value problems, Series.

The parameter method of Loitsyanskii is applied to numerical solution of a universal partial differential boundary-layer equation containing only one form parameter. Initial conditions for integration are the stream function values obtained by Loitsyanskii in the vicinity of the regular singular point of the equation. Introduction of stream velocity components leads to a system of partial differential equations with boundary conditions which is similar to the coventional boundary-layer equations and is solved by a finite-difference method. The procedure of solution, the formulas for calculating the values of the velocity components and stream function, and the computational technique are given. The accuracy of the calculation near the singular point was checked by comparing the results of numerical integration with those obtained by series expansion. Coincidence up to the fourth significant digit was obtained in the first steps. (Author)

AD-635 884 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
George Washington Univ., Washington, D. C. Logistics Research Project.
LOG-LINEAR REGRESSION.
by Dale M. Heien. 18 Jul 66, 13p Serial no. T-188
Contracts Nonr-761 (03), Nonr-761 (05)
Projs. NR-345-107, NR-047-001
Contract Nonr-761 (06), Proj. NR-347-008.

Descriptors: (*Statistical analysis, stochastic processes), Statistical distributions.

Identifiers: Regression analysis, Lognormal distribution.

The paper presents a reparameterization of the conventional log-linear regression model. The Stochastic assumptions of this reparameterized model are derived from the expected value properties of the dependent variable. Comparison with the conventional method of fitting log-linear models shows the regression intercept and the variance of the regression intercept to be different. A t-test is proposed for the intercept. Also regression through the origin is treated briefly. (Author)

AD-635 892 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
A METHOD OF SOLVING A BOUNDARY-VALUE PROBLEM FOR A LINEAR SECOND-ORDER DIFFERENTIAL EQUATION.
by I. F. Gredzhuk. 17 Jun 66, 14p TG-230-T482
Contract NOw-62-0604-c
TT-66-61811
Trans. of Ukrainskii Matematicheskii Zhurnal (USSR), v16 n3 p375-82 1964.

Descriptors: (*Boundary value problems, *Differential equations), Approximation (Mathematics), USSR, Polynomials.

A method is considered for finding upper and lower approximations for the solution y (x) of a boundary-value problem y' - Q (x)y = 0 for a linear second-order differential equation. The approximations are sought in the form of an n-th degree polynomial. As the degree of the polynomial increases, the error is sharply decreased. (Author)

AD-635 935 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
AN APPROXIMATE PSEUDOINVERSE SOLUTION TO ILL-CONDITIONED LINEAR SYSTEMS.
by Allen Klinger. Jul 66, 17p RM-4981-PR
Contract AF 49 (638)-1700

Descriptors: (*Approximation (Mathematics), *Matrix algebra), (*Dynamic programming, Matrix algebra), Equations, Numerical analysis.

Identifiers: Pseudo-inverse matrix.

The matrix pseudoinverse is shown to have properties analogous to those which have been used to solve ill-conditioned systems of linear equations. An approximate pseudoinverse is defined, shown to arise from a better conditioned system of equations, and used to obtain a quantity related to the statistical interpretation of the solution when random inaccuracies are added to the original system. The sensitivities of conventional, and approximate matrix pseudoinverse, solutions to an ill-conditioned system are compared in a numerical example. (Author)

AD-635 941 **Field 12A, 9D, 12B**
CFSTI Prices: HC$5.00 MF$1.00
George Washington Univ., Washington, D. C. Dept. of Statistics.
TOPICS IN INFORMATION AND DECISION PROCESSES.
Technical rept., Sep 64-May 65.
by Minoru Sakaguchi. Jul 66, 161p
Grant Nonr (G)-00029-65
Proj. RR003-05-01
Task NR042-247

Descriptors: (*Information theory, *Decision theory), (*Decision making, Information theory), Uncertainty, Game theory, Statistical analysis, Sequential analysis, Dynamic programming, Military strategy, Learning, Adaptive control systems.

The publication is an expanded version of a series of lectures by Professor Minoru Sakaguchi during the academic year, 1964/65. The contents cover: Individual Decision Making Under Uncertainty; Games and Strategic Information - Duels; Games and Strategic Information - Poker; Sequential Decisioning and Dynamic Programming; Interpretations of Information by Decision-Making Models; Statistical Decision Problems and Bayes Solutions; Information, Experience and Learning; Relationships Between Information Theory and Decision Theory; Amount of Information Provided by a Dichotomous Experiment; and Some Examples of Bayesian Adaptive Programming. (Author)

AD-635 959 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash. Mathematics Research Lab.
TOWARDS AN ALGEBRAIC CHARACTERIZATION OF CONVEX POLYHEDRAL CONES.
by Roger J. B. Wets, and Christoph Witzgall. Apr 66, 12p D1-82-0525, Mathematical note-461
Also available from the authors.

Descriptors: (*Matrix algebra, *Convex sets), Theory.

It is shown that the theory of positive linear independence and the properties of Jordan-equivalent matrices can be utilized effectively in order to obtain an algebraic characterization of a face structure of convex polyhedral cones. (Author)

AD-635 960 Field 12A
CFSTI Prices: HC$1.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash. Mathematics Research Lab.
CONTINUITY OF SOME CONVEX-CONE-VALUED MAPPINGS.
by David W. Walkup, and Roger J. B. Wets. Jun 66, 14p D1-82-0543, Mathematical note-471
Also available from the authors.

Descriptors: (*Mapping (Transformations), *Convex sets), Functional analysis, Topology.

The authors consider the class C of closed convex cones in a Hilbert space as a topological space and investigate the resulting topological properties of certain mappings into C. They show that with the proper choice of a Hausdorff metric for C the operation of taking the polar cone is an involutory isometry. The operation is considered of taking the positive hull of a finite set of points as a mapping into C and obtain some sufficient conditions for the continuity of this mapping. (Author)

AD-635 961 Field 12A
CFSTI Prices: HC$2.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash. Mathematics Research Lab.
SUFFICIENT CONDITIONS CONNECTED WITH DIFFERENTIAL INEQUALITIES OF THE FOURTH ORDER.
by Johann Schroder. Feb 66, 37p D1-82-0510, Mathematical note-454
Also available from the author.

Descriptors: (*Inequalities, Differential equations), Boundary value problems, Functions.

For abstract, see T 66 17.

AD-635 965 Field 12A
CFSTI Prices: HC$3.00 MF$0.75
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
ON THE APPROXIMATE SOLUTION OF THE DIRICHLET PROBLEM FOR POISSON'S EQUATION USING A-PRIORI POINTWISE BOUNDS AND CONTINUOUS APPROXIMATING FUNCTIONS.
Technical memo.
by D. G. Grant. May 66, 100p TG-828
Contract NOw-62-0604-c

Descriptors: (*Boundary value problems, *Approximation (Mathematics)), (*Functional analysis, Boundary value problems).

Identifiers: Theses, Poisson's equation.

Pointwise bounds on the solution of the Dirichlet problem for Poisson's equations are developed. The bounds are a-priori in nature and thus are completely determined by the Dirichlet data and the geometry of the region. To obtain a solution at a point one first formally substitutes the difference between the solution function and an unspecified continuous approximating function into the original bound expression. The resultant expression represents a bound on the error between the two functions at the point. This error bound is then minimized by proper choice of the approximating function as determined by the Rayleigh-Ritz procedure. In the limit the value of the approximating function equals the value of the solution at the point in question. Error bounds, calculated by the method of Rayleigh-Ritz, as well as actual errors are determined for a number of specified test problems. In this paper this approach is evaluated on the basis of both the effort required to obtain results and the quality of the results themselves in order to ascertain its value as a general method of solution. (Author)

AD-636 041 Field 12A
CFSTI Prices: HC$1.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash. Mathematics Research Lab.
MEAN-SQUARE APPROXIMATION BY GENERALIZED RATIONAL FUNCTIONS.
by A. A. Goldstein, and E. W. Chaney. Jun 66, 19p D1-82-0538, Mathematical note-465
Prepared in cooperation with Washington Univ., Seattle. Supported in part by AFOSR and ARO (D).

Descriptors: (*Aproximation (Mathematics), *Functional analysis), (*Least squares method, Approximation (Mathematics)), Numerical analysis.

The problem of numerical analysis to which this study is directed is that of determining an optimum approximation (in the least squares sense) to a given function f by a function of the form p/q, where p and q are confined to certain prescribed linear spaces. The analogous approximation problem employing the uniform norm has received much recent attention. To our knowledge no investigation of the present problem has appeared. (Author)

AD-636 042 Field 12A
CFSTI Prices: HC$3.00 MF$0.75
Boeing Scientific Research Labs., Seattle, Wash. Mathematics Research Lab.
THE RODRIGUES OPERATOR TRANSFORM, TABLES OF GENERALIZED RODRIGUES FORMULAS.
by T. P. Higgins. Dec 65, 59p D1-82-0493, Mathematical note-438

Descriptors: (*Operators (Mathematics), *Integral transforms), (*Tables, *Special functions (Mathematical)), Transformations (Mathematics).

Identifiers: Rodrigues' operator, Rodrigues' transform.

Tables of generalized Rodrigues formulas for various special functions are given to facilitate use of the ideas in the author's 'The Rodrigues Operator Transform, Preliminary Report,' AD-636 137. (Author)

AD-636 137 Field 12A
CFSTI Prices: HC$4.00 MF$1.00
Boeing Scientific Research Labs., Seattle, Wash. Mathematics Research Lab.
THE RODRIGUES OPERATOR TRANSFORM, PRELIMINARY REPORT.
by T. P. Higgins. Dec 65, 130p D1-82-0492, Mathematical note-437
See also AD-636 042.

Descriptors: (*Operators (Mathematics), *Integral transforms), Boundary valve problems, Transformations (Mathematics), Special functions (Mathematical).

Identifiers: Rodrigues' operator, Rodrigues' transform.

The generalized Rodrigues operators introduced include fractional integrals and the Laplace transform. All of the commonly treated special functions can be expressed in terms of these operators. Moreover, the recurrence, differentiation and transformation relations as well as the interrelations with other functions become immediate simple consequences of the calculus of the Rodrigues operators. Using the generalized Parseval relations a great many known integral transforms can be stated as a chain of Rodrigues operators. These include the Hankel, Stieljes, modified Bessel, Neumann, Legendre and hypergeometric transforms. The Rodrigues operators provide a clarification of the essential structure which unifies the relations of integral transforms, special functions and differential operators. This insight yields a technique whereby a new transform or chain of transforms can be tailor made to deal with an arbitrary differential operator. This method has application in a large number of boundary value problems of mathematical physics. (Author)

AD-636 151 Field 12A
CFSTI Prices: HC$2.00 MF$0.50
Stanford Univ., Calif. Dept. of Statistics.
UNLIMITED SIMULTANEOUS DISCRIMINATION INTERVALS IN REGRESSION.
Technical rept.
by Gerald J. Lieberman, R. G. Miller Jr, and M. A. Hamilton. 29 Jul 66, 28p TR-90
Contract Nonr-225 (53)
Proj. NR-042-002

Descriptors: (*Statistical analysis, *Least squares method), Inequalities, Simultaneous equations, Decision theory.

Identifiers: Regression analysis.

For abstract, see T 66 17.

AD-636 186 Field 12A
CFSTI Prices: HC$3.00 MF$1.00
Minnesota Univ., Minneapolis. School of Mathematics.
ERGODIC THEORY OF DYNAMICAL SYSTEMS. VOLUME I.
by A. Avez. 1966, 182p
Contract Nonr-3776 (00)

Descriptors: (*Measure theory, *Differential geometry), (*Algebraic topology, Measure theory), Mechanics.

For abstract, see T 66 17.

AD-636 223 Field 12A
CFSTI Prices: HC$2.00 MF$0.50
Virginia Univ., Charlottesville. Dept. of Economics.
POST-OPTIMALITY ANALYSIS VIA THE REVERSE SIMPLEX METHOD AND THE TARRY METHOD.
Research memo.
by C. van de Panne. Jul 66, 32p
Contract Nonr-4811 (00)
Proj. NR-047-056
ONR-RM-6
Prepared in cooperation with Groningia Univ. (Netherlands).

Descriptors: (*Optimization, *Linear programming).

Identifiers: Simplex method, Tarry method.

The practical applications of linear programming, not only the optimal solution but also solutions which have a somewhat lower value of the objective function are of interest. It is therefore desirable to generate all extreme-point solutions satisfying the constraints and giving a value of the objective function which differs by at most a given amount from the value for the optimal solution. Two methods are considered for generating these extreme points. The first method is called the reverse Simplex method, since it reverses the Simplex method for linear programming, the second is basic on the Tarry method for traversing a network such that all nodes are visited. The two methods are explained in detail, applied to an example and compared with each other. (Author)

N66-13169 Field 12A
CFSTI Prices: HC$1.00 MF$0.50
Midwest Research Inst., Kansas City, Mo.
RATIONAL APPROXIMATIONS TO THE SOLUTION OF THE SECOND ORDER RICATTI EQUATION.
Technical rept. 15 Jan-14 Oct 65.
by W. Fair, and Y. Luke. 1965, 11p
Contract NASR-63 (07)
NASA-CR-68503

Descriptors: *Differential equation, *Linear transformation, *Nonlinear equation.

For abstract, see T 66 17.

N66-15437 Field 12A
CFSTI Prices: HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst of Tech., Pasadena.
HADAMARD MATRICES OF ORDER 20.
by M. Hall Jr. 1 Nov 65, 49p JPL-TR-32-716
Contract NAS7-100
NASA-CR-67843

Descriptors: *Mathematics (Gen), *Matrix analysis.

N66-17245 Field 12A
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
INTRODUCTION TO MATRIX GENERALIZED INVERSES AND THEIR APPLICATIONS.
by S. E. Newhouse. Jan 66, 57p NASA-TM-X-55415, X-643-66-34

Descriptors: *Matrix algebra, *Linear equation.

N66-18323 Field 12A
CFSTI Prices: HC$3.00 MF$0.50
RAND Corp., Santa Monica, Calif.
MAXIMUM LIKELIHOOD ESTIMATION AND CONSERVATIVE CONFIDENCE INTERVAL PROCEDURES IN RELIABILITY GROWTH AND DEBUGGING PROBLEMS.
by R. E. Barlow, F. Proschan, and E. M. Schever. Jan 66, 51p RM-4749-NASA
Contract NASr-21 (11)
NASA-CR-70633

Descriptors: *Statistical analysis, *Mathematical model, *Probability distribution, *Reliability, *Sequential control.

N66-18354 Field 12A
CFSTI Prices: HC$1.00 MF$0.50
Brown Univ., Providence, R. I.
LIAPUNOV FUNCTIONS FOR THE PROBLEM OF LURIE.
by K. R. Meyer. 1964, 9p
Contract AF-AFOSR-693-64, Grant NsG-40-002-015
NASA-CR-60322
Prepared in Cooperation with Dept. of the Army Contract DA-31-124-ARO (D)-27.

Descriptors: *Differential equation, *Stability, *Liapunov function.

N66-18386 Field 12A
CFSTI Prices: HC$2.00 MF$0.50
Brown Univ., Providence, R. I.
A SURVEY OF SOME CURRENT RESEARCH IN FUNCTIONAL-DIFFERENTIAL EQUATIONS.
by J. K. Hale. 1965, 26p
Contract AF-AFOSR-693-64, Grant NGR-40-002-015
NASA-CR-60998
Prepared in cooperation with Department of the Army Contract DA-31-124-ARO (D)-270.

Descriptors: *Differential equation, *Geometry, *Functional analysis.

PB-169 963 Field 12A, 20I
CFSTI Prices: HC$4.00 MF$0.50
Institute of Plasma Physics, Nagoya Univ. (Japan).
A MODEL OF DISPERSIVE NON-LINEAR EQUATION.
Research rept.
by Nobuo Yajima, Akizi Outi, and Tosiya Taniuti. Feb 66, 21p IPPJ-47

Descriptors: (*Diffusion, Nonlinear differential equations), (*Nonlinear differential equations, Diffusion), Transformations (Mathematics), Wave functions, Mathematical models, Japan.

Consideration is given to a model of dispersive non-linear equation, which is derived from the Schrodinger equation by means of a non-linear transformation. The derivation is closely analogous to deriving the Burgers model from the diffusion equation. Then we obtain a solution resulting from an initial discontinuity, which corresponds to that of the Riemann's problem in the Burgers model. In the solution so obtained the limit that the Planck constant vanishes is discussed in comparison with the dissipative limit in the Burgers model which is realized by letting a dissipation constant tend to zero. It is shown explicitly that in these limits equations in the two models are same nevertheless their solutions are entirely different; for example, as is well known in the Burgers model one discontinuity develops from the initial discontinuity whilst in the new model two discontinuities develop, across each of which the so-called generalized Rankine-Hugoniot relations are not valid. (Author)

PB-170 438 Field 12A
CFSTI Prices: HC$6.00 MF$0.50
Illinois Univ., Urbana.
AN ABSTRACTION OF A COMBINATORIAL CONCEPT.
by A. A. Mullin. 1958, 1p
American Mathematical Monthly v68 n4 p364 Apr 1961. NSF Scientific Documentation Proj.

Descriptors: (*Combinatorial analysis, Set theory).

This note is concerned with giving a set-theoretical abstraction of the usual definition of the concept of combinations that appear in combinatorial analysis and to show an anomaly that occurs in the transfinite case when compared to the finite case. We adopt the notation of Cantor in representing cardinal numbers (i.e., the double-bar notation). (Author)

AD-635 570 See Field 20D

AD-635 654 See Field 20D

AD-635 774 See Field 20N

AD-635 848 See Field 5C

AD-636 037 See Field 9D

AD-636 252 See Field 20D

NAA-SR-11821 See Field 18K

12B. OPERATIONS RESEARCH

AD-635 733 Field 12B
CFSTI Prices: HC$1.00 MF$0.50
Redstone Scientific Information Center, Redstone Arsenal, Ala.
THE REDUCTION OF THE SOLUTION OF A GAME OF PURSUIT FOR SURVIVAL PAYOFF TO THE SOLUTION OF A COUCHY PROBLEM FOR A FIRST ORDER PARTIAL DIFFERENTIAL EQUATION.
by L. A. Petrosyan. 1 Jun 66, 9p RSIC-565
TT-66-61786
Trans. 'of Akademiya Nauk Armyanskoi SSR, Erevan. Doklady, v40 n4 p193-6 1965.

Descriptors: (*Game theory, *Partial differential equations), Optimization, USSR.

Identifiers: Cauchy problem.

For abstract, see T 66 17.

AD-635 881 Field 12B
CFSTI Prices: HC$1.00 MF$0.50
Naval Civil Engineering Lab., Port Hueneme, Calif.
THE TRANSPORTATION PROBLEM WITH VARIABLE DEMANDS.
Technical rept.
by Harry Gonshor. Jun 66, 15p TR-R-448
Y-F015-15-06-517

Descriptors: (*Linear programming, Transportation), (*Optimization, *Transportation), Scheduling, Mathematical models, Operations research.

The solution for the standard transportation problem assumes a constant supply at each source and a constant demand at each destination. In many practical applications it is desirable to know how the solution is affected if the demands at the destinations are varied. There are relatively simple, intuitively plausible, algorithms which produce solution to the modified problem. Unfortunately there exist counter-examples which show that these simple algorithms do not necessarily produce an optimum solution to the modified problem. The algorithm developed in this report produces an optimum solution to the modified problem with an amount of computation which increased roughly logarithmically with problem size. (Author)

AD-635 900 Field 12B, 5A
CFSTI Prices: HC$1.00 MF$0.50
Carnegie Inst. of Tech., Pittsburgh, Pa. Graduate School of Industrial Administration.
SEMI-INFINITE PROGRAMMING, DIFFERENTIABILITY AND GEOMETRIC PROGRAMMING: PART II.
Management sciences research rept.
by Abraham Charnes, William W. Cooper, and Kenneth O. Kortanek. Apr 66, 15p MSRR-74
Contract Nonr-760 (24)
Proj. NR-047-048
Prepared in cooperation with Northwestern Univ., Evanston, Ill., Technological Inst., Contracts Nonr-1228 (10), DA-31-124-ARO (D)-322, Proj. NR-047-021, rept. no. SRM-150; and Cornell Univ., Ithaca, N. Y. Dept. of Industrial Engineering and Operations.

Descriptors: (*Mathematical programming, *Management engineering), Theorems, Differential equations, Functions, Optimization.

Identifiers: Geometric programming.

The CCK duality theory of semi-infinite programming is specialized to situations involving differentiability (or partial differentiability) of objective and constraint functions to obtain in a uniform and direct manner various results and interpretations, such as generalization of the Kuhn-Tucker Theorem, the 'geometric' programming of Duffin-Peterson, and the Slater constraint qualification example. (Author)

AD-636 040 Field 12B
CFSTI Prices: HC$2.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash. Mathematics Research Lab.
L-SHAPED LINEAR PROGRAMS WITH APPLICATIONS TO OPTIMAL CONTROL AND STOCHASTIC PROGRAMMING.
by Roger Wets, and R. M. Van Slyke. Apr 66, 31p D1-82-0526, Mathematical note-462
Prepared in cooperation with California Univ., Berkeley.

Descriptors: (*Linear programming, *Stochastic processes), (*Control, Optimization), Algorithms.

This paper gives an algorithm for L-shaped linear programs which arise naturally in optimal control problems with state constraints and stochastic linear programs (which can be represented in this form with an infinite number of linear constraints). The first section describes a cutting hyperplane algorithm which is shown to be equivalent to a partial decomposition algorithm of the dual program. The two last sections are devoted to applications of the cutting hyperplane algorithm to a linear optimal control problem and stochastic programming problems. (Author)

AD-636 125 **Field 12B, 14D, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Boeing Scientific Research Labs. Seattle, Wash. Mathematics Research Lab.
EXPONENTIAL LIFE TEST PROCEDURES WHEN THE DISTRIBUTION HAS MONOTONE FAILURE RATE.
by Richard E. Barlow, and Frank Proschan. Jun 66, 31p D1-82-0415 rev, Mathematical note-468 Revision of D1-82-0415, AD614 608.

Descriptors: (*Statistical distributions, *Reliability), Life expectancy, Failure (Mechanics), Operations research, Quality control, Replacement theory, Statistical tests.

Identifiers: Exponential distribution.

A number of tests and estimates for mean life and other parameters derived under the exponential distribution assumption are studied under the alternative condition that the distribution has an increasing (decreasing) failure rate. The tests and estimates considered are, for the most part, based on censored and truncated samples. It is shown that the usual acceptance sampling procedures based on mean life generally favor the producer (consumer) in the IFR (DFR) case. However, acceptance sampling procedures based on the qth quantile tend to favor the consumer in the IFR case when q is small. The usual estimates for the mean based on the exponential assumption are positively (negatively) biased when the distribution is IFR (DFR). Many of these results hold under the weaker assumption that the distribution has an increasing (decreasing) failure rate on the average. (Author)

AD-636 222 **Field 12B**
CFSTI Prices: HC$1.00 MF$0.50
Virginia Univ., Charlottesville. Dept. of Economics.
MAXIMAL TWO-WAY FLOWS.
Research memo.
by B. Rothschild, and A. Whinston. Jun 66, 19p
Contract Nonr-4811 (00)
Proj. NR-047 056
ONR-RM-5

Descriptors: (*Linear programming, *Networks), Graphics, Algebraic topology, Feasibility studies, Theorems.

Identifiers: Max-flow min-cut theorem, Euler's network.

The most familiar network flow problem is that of finding the maximal integer flow from a source s to a sink t in a network G. In this paper we discuss the problem of simultaneous flows from s to t and from t to s. The main result of this paper is a max-flow min-cut theorem for this type of problem. The method of proof used indicates a procedure for finding the maximal flows. Finally, the problem of feasibility is discussed. (Author)

N66-15402 **Field 12B**
CFSTI Prices: HC$3.00 MF$0.50
Technisch Documentatie en Informatie Centrum Voor De Krijgsmacht, The Hague (Netherlands).
OPERATIONS RESEARCH V, TITLE INDEX.
1964, 55p TDCK-40683

Descriptors: *Game theory, *Management planning, *Quality control, *Bibliography, *Computer programming, *Operations research.

For abstract, see T 66 17.

AD-635 768 **See Field 9B**

AD-635 820 **See Field 6R**

AD-635 821 **See Field 6R**

AD-635 822 **See Field 6R**

AD-635 823 **See Field 6R**

AD-635 824 **See Field 6R**

AD-635 941 **See Field 12A**

AD-635 973 **See Field 13F**

AD-636 175 **See Field 5A**

AD-636 273 **See Field 14A**

PB-169 933 **See Field 13M**

13A. AIR CONDITIONING, HEATING, LIGHTING, AND VENTILATING

AD-446 233 **Field 13A, 21E**
CFSTI Price: HC$6.00
Battelle Memorial Inst., Columbus, Ohio.
COMPACT HEAT-EXCHANGER STUDY.
Final technical rept., 1 Jul 63-31 Mar 64.
by F. A. Creswick, S. G. Talbert, and J. W. Bloemer. 15 Apr 64, 76p
Contract DA-44-009-AMC-313 (X)

Descriptors: (*Heat exchangers, Performance (Engineering)), Design, Heat transfer, Pressure, Temperature, Specifications, Data, Volume, Fluid flow, Gas turbines, Bibliographies.

Heat-exchanger-performance data found in the literature are reduced to a form that allows compactness of core surfaces on the basis of geometrical configuration alone, by correcting for the influence of fluid properties and performance requirement parameters. Hydraulic radius of the core surface is shown to be the most important parameter affecting compactness. A compactness parameter is derived with which the required weight and volume of a heat exchanger for a given application may be estimated. Data and examples are given. The results of discussions with several heat-exchanger manufacturers to obtain state-of-the-art information on limitations in producing more compact surfaces are presented. Design studies are conducted to show the influence of hydraulic radius on the size and shape of a recuperator and precooler for a mobile, closed-cycle gas-turbine power plant and to illustrate the usefulness and accuracy of the compactness parameter. Recommendations for goals in a compact-heat-exchanger development program are presented. (Author)

AD-635 646 **Field 13A**
CFSTI Prices: HC$1.00 MF$0.50
Institute of Modern Languages, Inc., Washington, D. C.
ALL-ALUMINUM RADIATORS.
by H. W. Dumrath. Jun 66, 8p
Contract DA-44-009-AMC-1563 (T)
Proj. DA-1C024401-A328
ERDL-T-1850-66, TT-66-61780
Ganzaluminum-Autokuler, trans. of Aluminum (West Germany) v36 n6 p337-8 1960.

Descriptors: (*Radiators, Aluminum), West Germany, Heat exchangers, Engine structures, Water, Oil coolers, Air cooled.

The article discusses the design of water-filled all-aluminum automotive radiators. Oil-air heat exchangers are also discussed.

AD-635 683 **See Field 20M**

AD-636 178 **See Field 13J**

PB-169 949 **See Field 1E**

13B. CIVIL ENGINEERING

AD-475 186 **Field 13B**
CFSTI Prices: HC$2.00 MF$0.50
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
GUIDE MANUAL FOR SELECTION AND USE OF DUST PALLIATIVES AND SOIL WATERPROOFERS IN THE THEATER OF OPERATIONS.
by G. R. Kozan, and R. A. Pimental. Nov 65, 36p Miscellaneous Paper-4-756
Proj. 1-V-0-21701-A-046
Task 1-V-0-21701-A-046-05

Descriptors: (*Dust, Control), (*Soils, Moisture proofing), Runways, Military engineering, Instruction manuals, Landing fields, Airports, Roads, Military requirements, Asphalt, Plastics, Salts, Oils, Grasses, Water.

The manual provides interim guidance to military engineering personnel in selecting and using materials for alleviating dust and for waterproofing soils in support of operations on expedient airfields and roads in the theater of operations. The problems of dust and water pertinent to military operations on unsurfaced airfields and roads are defined, and the objectives and limitations of soil surface treatments to alleviate these problems are stated. General procedures for applying a dust palliative or soil waterproofer are outlined, and the implications of these procedures to the ultimate selection of a material are presented. Various types of materials for treating soil surfaces to control dust and/or waterproof soil are described. Criteria to aid in the selection and use of a material, and various factors which may influence the final choice of a material are presented. (Author)

PB-169 734 **Field 13B, 8F**
CFSTI Prices: HC$7.00 MF$1.75
Florida State Road Dept.
SEVERANCE STUDY - RURAL.
by William Saari. Dec 64, 340p Rept. no. 0012

Descriptors: (*Florida, Roads), (*Roads, Florida), Rural areas.

Identifiers: Highways, Land.

The report consists of case study descriptions and some general analysis of 106 rural parcels which were partially taken for highway right-of-way. The land parcels are located in ten different Florida counties and result from examining more than two thousand rural parcels. The 106 cases analyzed in the report are all those with bona fide sales. In general, gains to owners far exceeded losses. As in other studies, parcels near interchanges typically experienced value gains larger than those away from interchanges, apparently because interchange locations were sought for service station and motel sites. The losses experienced were minimal and were considered to have resulted primarily from distress sales and sales by uninformed sellers. (Author)

PB-169 735 **Field 13B, 8F**
CFSTI Prices: HC$7.00 MF$1.75
Florida State Road Dept.
SEVERANCE STUDY - URBAN.
by William Saari. 4 Aug 65, 403p Rept. no. 0181
See also PB-169 734.

Descriptors: (*Florida, Roads), (*Roads, Florida), Urban areas.

Identifiers: Highways, Land.

In 1963 Florida prepared a report that contained 128 case studies of remainder parcels in urban Jacksonville. This report consists of case study descriptions and some general analysis of the 52 parcels with bona fide sales from the over 600 parcels examined. The findings continue to show, as in the two previous reports, that the greatest enhancements in value were for remainder parcels near or adjacent to interchanges. The Florida researchers concluded that severance damage

payments are unwarranted on properties located adjacent to urban interchange areas, providing the remainder is at least of sufficient area to accommodate a full sized advertising billboard, and if ingress and egress are available.' Suitable sites for service stations at interchanges brought the greatest monetary gains to owners. Right-of-way acquisition from rear of low to moderate priced residential properties did not significantly reduce remainder values. Fewer than 20 percent of the parcels involved net losses and over half of these cases involved uninformed sellers and informed buyers. This study reported only original sales, although use of later sales would have shown much greater enhancement. (Author)

PB-169 928 **Field 13B, 5I**
CFSTI Prices: HC$3.00 MF$0.75
Southeastern Wisconsin Regional Planning Commission, Waukesha.
ORGANIZATION CHARTS AND POSITION DESCRIPTIONS.
Jul 63, 114p Procedural manual no. 1
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. and Housing and Home Finance Agency.

Descriptors: (*Job analysis, Management planning), (*Management planning, Job analysis), Transportation, Personnel.

The purpose of the manual is to record summary descriptions of the positions that may be held by employees of the Southeastern Wisconsin Regional Planning Commission. The description for each position includes a reference to placement in the over-all table of organization, to the distinguishing features of the work involved, to examples of the actual work involved, to qualifications required, to salary range, and to the title of the position and the number of such positions that may be filled.

PB-169 929 **Field 13B**
CFSTI Prices: HC$1.50 MF$0.50
Bureau of Public Roads, Washington, D. C.
GUIDE FOR TRAFFIC VOLUME COUNTING MANUAL. VOLUME 20, APPENDIX 26.
Feb 65, 50p

Descriptors: (*Traffic, Counting methods), Roads, Rural areas, Urban areas, Instruction manuals.

The purpose of the guide is to provide efficient procedures for making accurate estimates of annual average daily traffic (ADT) volumes based on sample counts. ADT is a fundamental traffic measurement needed for the determination of vehicle-miles of travel on the various categories of rural and urban highway systems. ADT values for specific road sections provide the highway engineer, planner, and administrator with essential information needed for the determination of design standards, the systematic classification of highways, and the development of programs for improvement and maintenance.

PB-169 937 **Field 13B**
CFSTI Prices: HC$4.00 MF$0.50
Arkansas Univ., Fayetteville.
JONESBORO, ARKANSAS. A COOPERATIVE PROJECT IN TRANSPORTATION AND URBAN PLANNING.
Jun 62, 55p
Prepared in cooperation with Arkansas State Highway Dept., Bureau of Public Roads, Washington, D. C.

Descriptors: (*Urban planning, Arkansas), (*Arkansas, Urban planning), (*Transportation, Arkansas), Roads, Population.

Identifiers: Land, Highways.

The Land Use and Transportation Plan is presented in three parts: PART I, the Plan itself, is schematic and represents the goal for the year 1980. In this part are presented three Figures depicting the Plan as it applies to the rural, urban, and central business sectors of the Planning Area along with sufficient materials to explain and define the Plan. PART II presents details and recommendations to guide in achievement of the elements of the Plan; it further defines specific elements of the Plan. PART III spells out the action which must be taken by the City, County, and State agencies to carry out the Plan recommendations. The vital importance of this section lies in the necessity of a realization of the inescapable truth that satisfactory accomplishment of the planning objective hinges on how well the Plan is implemented. (Author)

PB-169 954 **Field 13B**
CFSTI Prices: HC$1.50 MF$0.50
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
THE AIR RESOURCE MANAGEMENT CONCEPT AND ITS APPLICATION IN THE SOUTHWESTERN OHIO - NORTHERN KENTUCKY AIR POLLUTION SURVEY.
by James D. Williams, and Clark L. Gaulding. 26 Oct 65, 10p

Descriptors: (*Natural resources, Air), (*Air pollution, Control), Management engineering, Ohio, Kentucky, Reviews.

For abstract, see T 66 17.

PB-169 958 **Field 13B, 5C**
CFSTI Prices: HC$3.00 MF$0.50
California State Div. of Highways.
COST COMPARISON STUDY. A COST COMPARISON OF MANUAL AND COMPUTER METHODS OF CALCULATING TRAVERSE-VERTICAL ALIGNMENT-EARTHWORK.
by W. J. Ellis, and G. M. Anthony. Mar 66, 30p
Rept. no. 0456
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Costs), (*Computers, Costs), Civil engineering, Systems engineering, Data processing systems, Statistical data, Reduction, Effectiveness, Surveying.

The study was initiated to obtain statistical cost data on manual and computer engineering methods. The scope of the cost study included analyses of traverse, vertical alignment and earthwork calculations. The study reports a definite cost saving by the use of computer methods. Traverse savings range from $0.26 per course for simple traverse calculation to $0.78 per course for the more complex problem. Computer methods can calculate areas at a $3.22 saving and curve data for highway alignment at a $0.82 saving. The average saving for traverse work by computer method is reported to be $0.45 per course. Average savings of $0.10 per calculated elevation results for computerized vertical alignment while approximately $1.00 per cross section can be saved when earthwork quantities are machine calculated. Detailed analyses showing variation of cost data is included in the report. The study also showed that machine methods produce a superior level of accuracy and consistency. In spite of cost savings, disadvantages from computeration exist. One concerns ADP processing requiring the data to be out of the user's hands for too long a period of time. Additional disadvantages as well as merits are listed in the report. (Author)

PB-170 428 **Field 13B, 14B**
CFSTI Prices: HC$6.00 MF$0.50
Texas Transportation Inst., College Station.
DYNAMIC DEFLECTIONS USING THE ELECTROMAGNETIC VIBRATORS.
Rept. on survey of library facilities proj.
Mar 64, 17p Bibliog-64-10
Proj. 2-8-54-1
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Pavements, Deflection), Dynamics, Bibliographies, Roads, Vibrators (Electrical), Flexible structures, Loading (Mechanics), Elasticity.

Thirty-one annotated references are given concerning dynamic deflection studies of pavements.

PB-170 429 **Field 13B, 11G**
CFSTI Prices: HC$4.00 MF$0.50
California State Div. of Highways.
STUDY OF THE EFFECTS OF WATER ACTION ON BITUMINOUS MIXTURES.
Final rept.
by John L. Beaton. 15 Jul 65, 23p Rept. no. 0258
Proj. M/R-230068
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Materials), (*Asphalt, Tracer studies), Water, Salts, Dyes, Abrasives, Lithium compounds, Chlorines.

Identifiers: Lithium chloride.

A modified method was developed for using the ASTM Tracer Salt technique for measuring the percentage of stripping of the total mix gradation. Studies indicate that the repeatability of the modified Tracer Salt method is not as good as the Dye solution procedure. The percentage of stripping determined by the Dye and Tracer Salt methods was compared with the surface water abrasion test results on a number of different aggregates. The results show that the abrasion loss and percentage of stripping are related. (Author)

PB-170 443 **Field 13B, 9B**
CFSTI Prices: HC$4.00 MF$0.50
Texas Transportation Inst., College Station.
COMPUTER TRAFFIC CONTROL.
Rept. on survey of library facilities proj.
Nov 63, 25p Bibliog-63-8
Proj. 2-8-54-1
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Traffic, Control), (*Computers, Traffic), Bibliographies, Abstracts, Roads.

Fifty-four references are included.

PB-170 475 **Field 13B**
CFSTI Prices: HC$1.50 MF$0.50
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio. Lab. of Engineering and Physical Sciences.
THE TREND OF SUSPENDED PARTICULATES IN URBAN AIR: 1957-1964.
Environmental health series.
by T. B. McMullen, and R. Smith. Sep 65, 28p
PHS-Pub-999-AP-19

Descriptors: (*Air pollution, Particles), (*Dust, Density), Samplers, Collecting methods, Statistical analysis, Environment, Urban areas, Meteorological parameters.

The trend toward lower average concentrations of suspended particulate pollution in the urban air in the United States from 1957 through 1963, indicated by measurements of the National Air Sampling Network, is investigated from three aspects: (1) statistical significance, (2) the validity of the sampling and analytical methods, and (3) relationship to environmental changes in the vicinity of the sampling stations. The evidence indicates that the decline is real and that the methods employed can reliably detect substantive changes in the concentration of suspended particulate pollution. Information on changes in the environments of a representative group of stations revealed that where significant decreases in suspended particulates occurred, they were often logically related to specific changes in source emissions. Thus the indicated decline in the suspended particulate portion of urban air pollution is verified and substantially accounted for. A statistically significant increase in

the annual mean occurred in 1964; if continued, such an increase would suggest the possibility of cyclic influences. (Author)

PB-170 479 **Field 13B, 9C**
CFSTI Prices: HC$3.00 MF$0.50
Bureau of Reclamation, Denver, Colo. Chemical Engineering Branch.
DIRECT-CURRENT MEASUREMENT OF THE ELECTRICAL RESISTIVITY OF ROCK AND CONCRETE DRILL CORE USING THE OHM-METER TECHNIQUE.
by G. A. Teter. 14 Jan 66, 18p Rept. no. ChE-44

Descriptors: (*Rock, Resistance (Electrical)), (*Concrete, Resistance (Electrical)), (*Ohmmeters, Operation), Powerplants (Establishments), Electrometers, Moisture, Test methods, Effectiveness, Direct current.

Identifiers: Grounding (Electrical).

An investigation was made of the suitability of a vacuum tube electrometer as a wide range ohmmeter for measuring the resistivity of rock and concrete cores at varying degrees of water saturation. While the present system was greatly improved over that of past usage, measurement noise, instrument drift, measurement time and basic inaccuracy severely limited the systems capabilities. It was determined that this technique was completely inadequate for the required measurement. It is recommended that both a-c and d-c bridges be used in further in further research. Variation of resistivity with applied voltage and frequency should be established. (Author)

PB-170 483 **Field 13B**
CFSTI Prices: HC$4.00 MF$0.50
North Carolina State Univ., Raleigh. Dept. of Engineering Research.
AN INVESTIGATION OF THE STABILITY OF HIGHWAY CUT SLOPES AND EMBANKMENTS IN NORTH CAROLINA.
Final rept.
by C. J. Leith, C. P. Fisher, C. S. Deal, and H. D. Meyer. May 65, 36p Rept. no. 0404
Proj. ERD-110-U
Prepared in cooperation with North Carolina State Highway Commission and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Stability), North Carolina, Erosion, Geology, Soils, Motion, Rock (Geology).

The purposes of the study were to (1) determine the magnitude of the slope instability problem in North Carolina, (2) relate instability to specific geologic and other physical factors, and (3) provide the highway department with a useful correlation of soil type or geologic formation and type and frequency of slope movement.

PB-170 580 **Field 13B, 2C**
CFSTI Prices: HC$1.50 MF$0.50
Bureau of Reclamation, Denver, Colo. Hydraulics Branch.
VERTICAL ADJUSTABLE WEIR.
by J. C. Schuster.] Mar 66, 20p Hyd-553

Descriptors: (*Irrigation systems, Dams), (*Dams, Design), Hydrostatic pressure, Fluid flow, Tests, Measurement.

Identifiers: Weirs.

Discharge measurement accuracy of a vertically adjustable Cipolletti weir having a 2-ft crest length was investigated in the laboratory. The investigation included determination of head-discharge relationship of the weir and a means of standardizing the method of relating elevation of the movable weir crest to head of water on the crest. Discharges indicated by the weir head were in general in good agreement with discharges measured by volumetrically calibrated Venturi meters for movable crest elevations greater than 0.1 ft above the stationary weir. Reliable discharge measurements could not be made for movable weir crest elevations less than about 0.1 ft above the stationary crest. (Author)

PB-170 581 **Field 13B, 13F, 5C**
CFSTI Prices: HC$6.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge.
BIBLIOGRAPHY OF HIGH SPEED GROUND TRANSPORT. PART IA.
15 Oct 65, 86p
Contract C-85-65
See also PB-168 648,-169 121.

Descriptors: (*Transportation, Research program administration), (*Railroads, Research program administration), (*Roads, Research program administration), (*Civil engineering, Transportation), (*Bibliographies, Transportation), Urban planning, Urban areas, Economics, Sociology, Systems engineering, Feasibility studies.

PB-170 700 **Field 13B, 7A**
CFSTI Prices: HC$6.00 MF$0.75
Advanced Waste Treatment Research Activities, Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
ADSORPTION OF BIOCHEMICALLY RESISTANT MATERIALS FROM SOLUTION.
by J. Carrell Morris, and Walter J. Weber Jr. Mar 66, 116p AWTR-16
Contract SAph-76295
PHS-Pub-999-WP-33
Rept. on Environmental Health Series, Water Supply and Pollution Control.

Descriptors: (*Water supplies, Purification), (*Carbon, Adsorption), (*Pesticides, Disposal), Organic compounds, Sewage, Fluidized bed processes, Aluminum compounds, Oxides, Thermodyanmics, Water pollution, Control.

Earlier studies (see PB-168 799) showed that activated carbon for waste water renovation could best be used in continuous-flow columns. Such techniques should result in ad adsorptive capacity of greater than 10 percent. Results on studies of adsorption of organics from single- and multi-component systems in fluidized carbon are reported herein. The adsorbability of organic pesticides on activated carbon was investigated in some detail. Studies were undertaken to characterize those types of organic pollutants that are not adsorbed on activated carbon. (Author)

PB-170 701 **Field 13B**
CFSTI Prices: HC$1.50 MF$0.75
Public Health Service, Cincinnati, Ohio. Div. of Air Pollution.
AIR PARTICULATES NO. 1 STUDY NUMBER 22.
by James S. Ferguson, Ronald T. Cope, and Earl F. McFarren. 1965, 85p PHSP-999-AP-22

Descriptors: (*Air pollution, Particles), (*Particles, Visual inspection), Atmosphere, Dust, Microscopes, Identification.

In the study, 35 participants each analyzed 10 slides of selected air particulates permanently mounted in a solid plasticizer. Slides 1 through 7 contained a single particulate, while slides 8 and 9 contained three each, and slide 10 contained 9 particulates. Of 770 possible correct identifications that could be made by the 35 participants analyzing the 10 slides, 247 correct identifications were made. Among the participants identifying these particulates, those using a polarizing microscope and a range of magnifications did better than those not doing so. Whereas most of the participants did reasonably well in estimating the size of the particulate on slide number 2, most did very poorly in estimating the percent by weight of each component on slides 8, 9, and 10. Although no text or standard method on identification of atmospheric particulates exists, the overall results of the study were very good. (Author)

PB-170 742 **Field 13B, 14B**
CFSTI Prices: HC$4.00 MF$0.75
Public Health Service, Washington, D. C. Div. of Environmental Engineering and Food Protection.
EVALUATION OF WATER LABORATORIES.
1966, 59p PHS-Pub-999-EE-1

Descriptors: (*Water supplies, Biological laboratories), (*Water pollution, Biological laboratories), (*Biological laboratories, Standards), Culture media, Water, Laboratory equipment, Effectiveness.

Identifiers: Evaluation.

The publication provides performance standards for evaluation of the bacteriological laboratory procedures and equipment as required by the 1962 Edition of the Public Health Service Drinking Water Standards and is in conformance with the 12th Edition of Standard Methods for the Examination of Water and Wasterwater. To promote greater uniformity, the State laboratory survey officers should make every effort to obtain strict and complete adherence to standard requirements and to apply uniformly the recommended procedures in the Drinking Water Standards for decertification when there is failure to correct violations within a reasonable period of time.

PB-170 744 **Field 13B, 11L**
CFSTI Prices: HC$4.00 MF$0.75
Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio.
AIR POLLUTION AND THE KRAFT PULPING INDUSTRY. AN ANNOTATED BIBLIOGRAPHY.
by Paul A. Kenline, and Jeremy M. Hales. Nov 63, 124p
PHS-Pub-999-AP-4

Descriptors: (*Paper industry, Air pollution), (*Air pollution, Paper industry), (*Wood pulp, Odors), Bibliographies, Abstracts, State-of-the-art reviews, Waste gases, Sulfates, Control systems, Processing.

Since the first kraft mill came into existence in 1891, the potential odor problem has been well recognized. Accordingly, a great deal of literature has been published describing practical and theoretical work in the field of kraft mill odor control. Some progress has been made, but even today most kraft mills are faced with serious problems of atmospheric pollution. An annotated bibliography is provided of articles concerning measurement and control of kraft mill air-borne pollution currently available in the literature. It is intended that this should provide a retrospective view of what has been accomplished and should form a sound basis for further work in the field. In addition to 154 abstracts, this bibliography contains a description of the kraft pulping process, a survey of mill emissions, and a consideration of control measures. (Author)

PB-170 851 **Field 13B**
CFSTI Prices: HC$4.00 MF$0.75
Public Health Service, Cincinnati, Ohio. Div. of Air Pollution.
ATMOSPHERIC EMISSIONS FROM COAL COMBUSTION AN INVENTORY GUIDE.
by W. S. Smith, and C. W. Gruber. Apr 66, 114p
PHS-Pub-999-AP-24
Rept. on Environmental Health Series, Air Pollution.

Descriptors: (*Air pollution, Coal), (*Coal, Combustion), Smokes, Particles, Particle size, Gases, Sulfur compounds, Nitrogen compounds, Oxides, Dioxides, Furnaces, Chemical properties, Physical properties.

Identifiers: Sulfur dioxide, Sulfur trioxide, Nitrogen oxides.

Information concerning atmospheric emissions arising from the combustion of coal was collected from the published literature and other sources. The data were abstracted, assembled, and converted to common units of expression to facilitate comparison and understanding. From these data, emission factors were established that can be applied to coal combustion processes to determine the magnitude of air pollutant emissions. Also discussed are the composition of coal, theory of coal combustion, emission rates, gaps in emission data, and future research needs. (Author)

PB-170 876 **Field 13B, 11B**
CFSTI Prices: HC$2.00 MF$0.50
Colorado State Dept. of Highways. Planning and Research Div.
CONCRETE PAVEMENT JOINT STUDY - 1965.
Final rept.
20 May 66, 28p STS-0477
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. Availability: Original document in color until exhausted.

Descriptors: (*Concrete, Pavements), (*Pavements, Concrete), Joints, Reinforced concrete, Cements, Thickness, Traffic, Soil mechanics, Air, Temperature, Aging (Materials), Colorado.

The major design features included in five projects were (1) sawed versus formed transverse joints, (2) time interval between concrete placement and joint sawing, (3) plain versus reinforced concrete pavement, (4) joint spacing, (5) depth of transverse saw cut and (6) thickness of cement-treated subbase. The design features were primarily evaluated in terms of transverse, longitudinal and diagonal cracking of the pavement slabs. This evaluation considered the effects on cracking of such factors as soil characteristics, concrete mix and strength, air temperature and traffic density. Conclusions: (1) Concrete pavements with sawed joints are as resistant to cracking as those with formed joints. (2) plain concrete slabs of 25 feet are as resistant to cracking as those of 20 feet. (3) Optimum time for sawing transverse joints is from 12 to 24 hours after placement of concrete. (4) A 1 1/2-inch deep saw cut appears to be adequate for transverse joints in 8-inch thick concrete pavement. (Author)

PB-170 877 **Field 13B, 13M**
CFSTI Prices: HC$1.00 MF$0.50
Virginia Council of Highway Investigation and Research, Charlottesville.
A COMPARISON OF BRIDGE DECK ROUGHNESS: 1963 AND 1965.
by M. H. Hilton, K. M. Gloeckner, and F. M. Regnier. Mar 66, 13p SR-66-12, STS-0488
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. See also PB-170 508.

Descriptors: (*Bridges, Pavements), Roughness, Surfaces, Concrete, Virginia.

In 1963 the Virginia Council of Highway Investigation and Research initiated a study to determine the degree and causes of bridge deck roughness. Based partially on the preliminary results of this study, special provisions for finishing bridge decks were issued by the Department of Highways for all structures constructed after April 1, 1964. This report presents a comparison of the riding quality of bridge decks constructed before and after adoption of the special provisions. The increased emphasis on obtaining smoother bridge decks proved fruitful regardless of the construction techniques used, with bridge decks constructed subsequent to the 1964 special provisions having, on the average, appreciably better riding qualities than those constructed prior to 1964. Longitudinal screeding produced the smoother bridge decks and this method of screeding was used more frequently after issuance of the 1964 special provisions which stated preference for the method. Considerable variation in the roughness of bridge decks screeded by the same method suggests that control and quality of workmanship and equipment must be maintained at high standards to obtain results capable of being achieved. (Author)

AD-477 706 **See Field 13M**

AD-635 775 **See Field 8F**

PB-169 933 **See Field 13M**

PB-170 426 **See Field 11G**

PB-170 430 **See Field 13M**

PB-170 432 **See Field 13M**

PB-170 442 **See Field 13C**

PB-170 445 **See Field 14B**

PB-170 482 **See Field 11B**

PB-170 506 **See Field 13M**

PB-170 508 **See Field 13M**

PB-170 519 **See Field 13M**

PB-170 633 **See Field 6E**

PB-170 637 **See Field 13M**

PB-170 745 **See Field 4B**

13C. CONSTRUCTION EQUIPMENT, MATERIALS, AND SUPPLIES

PB-170 434 **Field 13C, 13M**
CFSTI Prices: HC$4.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
FURTHER TESTS OF ASPHALT-STONE ADHESION AND ITS WATER SENSITIVITY.
by Peter J. Desio. Sep 65, 31p Research rept. no. R65-49, 0314
Contract DSR-9326
Prepared in cooperation with Bureau of Public Roads. Washington, D. C. and Massachusetts Dept. of Public Works.

Descriptors: (*Asphalt, Adhesion), Rock (Geology), Surfaces, Moisture, Degradation, Liquid immersion tests, Bonded joints, Tests.

Peeling tests of stone-asphalt-aluminum foil joints are described. Methods of specimen preparation are discussed. Peeling rate as a function of dead weight load has been maesured at 70F, 50% R.H. and 70F, 100% R.H. The saturated environment produces some peel rate increases, at 200-250 hours exposure, but at longer exposure intervals, the peel rates reduce to those of unexposed controls. A new test method at a constant peel rate has been developed, and offers certain advantages. Preliminary results from water immersed tests on water immersed specimens suggest some weakening influences, though conclusions await more data. Future work is indicated. (Author)

PB-170 442 **Field 13C, 13B**
CFSTI Prices: HC$3.80 MF$0.50
Texas Transportation Inst., College Station.
VIBRATORY PILE DRIVING.
Rept. on survey of library facilities proj.
Dec 63, 8p Bibliog-63-16
Proj. 2-8-54-1
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Foundations (Structures), Reviews), Roads, Construction, Vibrators (Mechanical), Bibliographies.

Identifiers: Pile driving.

Summaries are given of nine papers, published between 1956 and 1963, concerning vibratory pile driving.

13D. CONTAINERS AND PACKAGING

PB-170 626 **See Field 11L**

13E. COUPLINGS, FITTINGS, FASTENERS, AND JOINTS

AD-635 651 **Field 13E, 11A**
CFSTI Prices: HC$3.60 MF$0.50
New York Naval Shipyard, Brooklyn. Material Lab.
DESIGN MANUAL ON ADHESIVE BONDED GLASS REINFORCED PLASTIC JOINTS.
Progress rept.
13 Jun 58, 34p Rept. no. 5616-1, PR-8

Descriptors: (*Bonded joints, *Epoxy plastics), Adhesives, Glass textiles, Reinforcing materials, Configuration, Design, Structural parts, Structural properties.

This manual provides technical information of use to the design engineer in the construction of adhesive bonded glass reinforced plastic (GRP) joints. The characteristics of GRP that have an important bearing on the design of adhesive bonded joints are discussed and the more general joint designs of interest to the engineer working with GRP are illustrated. Numerous examples of typical GRP joints and structural assemblies occurring in service are presented together with representative strength values which were obtained in a general investigation program. In obtaining these values, various GRP materials were used as adherends. The adhesive used throughout consisted of a 2-part (resin and hardener) room-temperature setting epoxy resin adhesive which met the requirements of a proposed military specification for adhesives for GRP structural applications. Although the numerical bond strengths reported may be affected by the use of other adhesives and GRP materials, they are considered to represent typical values for general applications. It should be noted that, generally, lower values than those reported may be expected to result if mat materials are used as adherends instead of fiber glass cloth reinforced materials. The numerical values presented with the illustrations can serve as guides to the design engineer, who may find them useful to employ in conjunction with general principles underlying joint and structure design. (Author)

13F. GROUND TRANSPORTATION EQUIPMENT

AD-635 973 **Field 13F, 12B**
CFSTI Prices: HC$2.00 MF$0.50
Cornell Aeronautical Lab., Inc., Buffalo, N. Y. Transportation Research Dept.
AN ANALOG COMPUTER SIMULATION STUDY OF THE LATERAL DYNAMICS OF AN AUTOMATICALLY-GUIDED AUTOMOBILE.
by Sabi J. Asseo. Jan 66, 40p Full-Scale Div-M-381

Descriptors: (*Dynamics, *Passenger vehicles), (*Simulation, *Analog computers), Automatic, Guidance.

The computer study is based on design data pertaining to the 1953 Buick. The characteristics of current automobiles are not appreciably different from the model used in the computer mechanization. Therefore, by building sufficient flexibility in the gain adjustments of the system, the same controller can be made to operate with any full size American car. The static margin of the automobile is an important factor in the selection of gain constants. It is preferred to use an automobile with zero or positive static margin. If an automobile is understee (positive static margin), varying the tire pressure and changing the CG location by adding weight to the car, can change the static margin

to improve the handling characteristics. To provide controllability over a wide range of lateral displacements from the desired path, the pickup coils should be located as far apart about the centerline of the car as practical. The coil inclination angle can be determined experimentally to provide a maximum range of controllability, for a given coil clearance. The servo actuator used need not have a fast response, especially at low forward velocities. However, the use of high pressure valves with low load reflection is advantageous, in allowing higher servo feedback gains at high forward velocities, without causing minor loop oscillations. (Author)

AD-635 966 See Field 9B

PB-170 581 See Field 13B

13G. HYDRAULIC AND PNEUMATIC EQUIPMENT

AD-635 832 Field 13G, 20D
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
STRUCTURE OF THE FLOW IN RELATIVE MOTION AT THE INLET OF A CENTRIFUGAL COMPRESSOR IMPELLER.
by B. L. Gunbin. 19 May 66, 10p FTD-HT-66-187
TT-66-61791
Unedited rough draft trans. of Energomashinostroenie (USSR), n10 p43-4 1964.

Descriptors: (*Impellers, *Gas flow), (*Compressors, Gas flow), Three-dimensional flow, Turbines, Compressor blades, USSR.

The results of investigating the three-dimensional flow at the inlet to the working vanes of a centrifugal compressor impeller are introduced with measurement of the parameters of flow in relative motion. (Author)

AD-635 835 Field 13G, 20D
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
THE EXPERIMENTAL AND ANALYTICAL DETERMINATION OF FLOW CHARACTERISTICS OF PNEUMATIC RESISTANCES.
by Lech. M. Kaminski. 23 May 66, 17p FTD-TT-65-1758
TT-66-61794
Edited trans. of Archiwum Automatyki i Telemechaniki (Poland) v8 n3 p335-46 1963.

Descriptors: (*Pneumatic devices, *Gas flow), (*Throttling, Gas flow), Determination, Mathematical analysis, Pressure, Force (Mechanics), Poland.

The paper presents an experimental and analytical method of determining the set of curves, representing flow characteristics of pneumatic resistances. The flow characteristics determined by means of this method give the relationship between the intensity of air flow and the pressure drop and the resistance over the full range of pressures encountered in pneumatic control devices. Analysis of various formulas and laboratory measurements lead to the conclusion that the most convenient formula for the pneumatic resistors is the equation for quantity of flow in long pipes. The formula is obtained on the assumption that friction is not neglected and so it gives a very good approximation of experimental results. Using this formula, it is often possible to obtain all the curves of the flow characteristic from one measurement of flow quantity under particular conditions. Dimensionless coordinates, which are used here, provide a considerable simplification of analysis because, one universal characteristic is obtained for all resistances. Flow characteristics depend not only upon the diameter and length of the throttling resistance but also surface roughness, the inlet and outlet, etc. In some cases, therefore, special corrective factors must be introduced into the universal characteristics. (Author)

AD-636 113 Field 13G
CFSTI Prices: HC$8.60 MF$0.75
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
AN ANALYSIS OF AN ELECTROHYDRAULIC CLOSED-LOOP SERVOMECHANISM.
Master's thesis.
by Louis Baeriswyl Jr. May 51, 83p Bumblebee-155
Contract NOrd-7386

Descriptors: (*Seromechanisms, Analysis), Servo amplifiers, Gain, Phase studies, Mathematical prediction, Performance (Engineering), Electromechanical converters, Hydraulic actuators, Synchros.

An investigation was made to analyze the functioning of a closed-loop electrohydraulic servomechanism by varying the frequency of the sinusoidal input signal, and studying the phase lag of the output signal and the amplitude ratio of output to input signal. The gain of the closed-loop system was maintained constant while the time constant of the servo amplifier was adjusted to several selected values. For each time constant selected for the servo amplifier, the closed-loop system was maintained constant while the time constant of the servo amplifier was adjusted to several selected values. For each time constant selected for the servo amplifier, the closed-loop system response curves of phase lag and the ratio of the amplitude of output to input were obtained. The phase lag and amplitude ratio of the servo system is predicted more accurately by the theoretical results for the third-order system, than those of the second-order system. The theoretical third-order closed-loop system may be used to predict characteristic results over a frequency range up to approximately ten cycles per second, when engineering accuracy is required. This is particularly true with regard to the phase-lag characteristics. The order of the closed-loop system is greater than the third, as indicated by the phase lag and output signal attenuation being greater than that theoretically predicted for a third-order system.

N66-14633 Field 13G
CFSTI Prices: HC$1.00 MF$0.50
Syracuse Univ. Research Inst., N. Y. Dept. of Mechanical and Aerospace Engineering.
NOISE INVESTIGATIONS WITH IMPINGING JET FLOWS.
Status rept. no. 5, 1 Jun-30 Nov 65.
by D. S. Dosanjh, and F. J. Montegani. Dec 65, 23p ME-1085-651205
Grant NsG-431
NASA-CR-69108

Descriptors: *Jet flow, *Noise.

For abstract, see T 66 17.

13H. INDUSTRIAL PROCESSES

AD-467 050 Field 13H, 21H
CFSTI Prices: HC$2.00 MF$0.50
Battelle Memorial Inst., Columbus, Ohio.
CRYOGENIC FORMING OF TYPE 301 STAINLESS STEEL.
by A. G. Imgram. 21 Apr 65, 44p
Contract DA-01-021-AMC-11706 (Z)
RSIC-408

Descriptors: (*Stretch forming, Cryogenics), (*Stainless steel, Stretch forming), Reviews, Rocket cases, Pressure vessels, Sheets.

Identifiers: Stainless steel 301.

Deformation at subzero temperatures significantly increases the strength of 300 series, stainless-steel alloys; Type 301 stainless steel exhibits the greatest response of any commercial alloy. High strength, cryogenically-formed, stainless-steel sheet can be produced, but welding reduces its strength. A process has been developed by which a wleded preform is expanded at cryogenic temperatures to final size by internal pressurization. This technique has been used to produce pressure vessels of prototype and actual rocket motor case configurations. (Author)

AD-476 292 Field 13H, 14B
CFSTI Prices: HC$4.00 MF$1.00
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
THE APL RESISTANCE WELDER.
Technical memo.
by Richard C. Evans, and Algimantas Dargis.
May 65, 106p TG-687
Contract NOw-62-0604-c

Descriptors: (*Welding, *Machines), Reliability, Storage batteries, Transistors, Instrumentation, Statistical analysis, Satellites (Artificial), Deformation, Electromagnetic pulses, Metallography, Tables, Switching circuits, Dynamics, Resistance (Electrical), Nickel alloys.

A new welding machine was developed consisting of a set of storage batteries to supply current, a bank of transistor switches to regulate the magnitude and duration of the current, and a commerical welding head. The new welder produces: (1) A pulse whose current and duration can be independently controlled to a high degree of accuracy, (2) A pulse whose current remains very close to its predetermined value regardless of changes in resistance in the weld being made, and (3) A pulse which is constant from day-to-day and from machine-to-machine. The new machine offers important advantages over the presently used capacitor welders. (1) Settings are uncritical as to current, pulse-time, and tip pressure after a well-defined minimum has been exceeded. This permits far greater variability in operator and material without ill effect. (2) No longer is it necessary to work out schedules of settings for each machine; it is now feasible to prepare a single manual of settings which may be used on all machines. (3) It is no longer necessary to make the usual twice-daily calibration. (4) The best combination of current and time for each pair of materials may now be used. (Author)

AD-635 572 Field 13H, 11F
CFSTI Prices: HC$2.00 MF$0.50
Martin Co., Denver, Colo.
CENTER FOR HIGH-ENERGY-RATE FORMING.
Quarterly technical progress rept. no. 3.
by A. A. Ezra. 1 Apr 66, 31p CR-65-77/3
Contract DA-19-066-AMC-266 (X)
AMRA-CR-66-05/3
Prepared in cooperation with Denver Univ., Colo.
See also AD-635 486.

Descriptors: (*Explosive forming, Reports), Information retrieval, Hardening, Strain (Mechanics), Differential equations, Equations of motion, Deformation, Deflection, High-speed photography, Electron microscopy, Aluminum alloys.

Identifiers: HERF.

The report includes: (1) Information Retrieval System: Work was begun on adapting an existing computer program at the University of Denver for storage and retrieval of information in high energy rate forming. (2) Shock Hardening or Strengthening of Metals: Investigations began on the use of a mouse-trap type of plane wave generator to provide known dynamic pressures. Velocity measurement techniques are being developed. Techniques are being developed for the preparation of specimens of shock loaded metals for electron microscope examinations. (3) Strain Rate Effects: Progress has been made in developing the optical light lever and streak camera techniques for measuring free surface displacements as a func-

tion of time. Strain rate of the order of 100 inches per inch per sec. were observed. (4) Computer Program for Predicting Process Parameters: The differential equations of motion for the large dynamic plastic deformation of a metal blank were programmed for solution on an IBM 1620 computer. Large deflection analysis was used, and implicit integration is being used in the programming to speed up computations. (5) Theoretical Determination of Formability Limits: The minimum blank width to diameter ratio required to prevent uneven pull in was investigated theoretically.

AD-635 628 **Field 13H, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Carnegie Inst. of Tech., Pittsburgh, Pa.
THE EFFECT OF RAPID AUSTENITIZING ON A NIOBIUM STEEL.
Technical paper.
by Tatsumi Osuka, and Harold W. Paxton. 15 Jun 66, 17p
Contract Nonr-760 (14)
Proj. NR-036-029

Descriptors: (*Steel, *Heat treatment), Niobium alloys, Carbon alloys, Grain structures (Metallurgy), Transition temperature, Austenite.

The effect of short time austenitizing treatments on 0.21% carbon steel, with or without niobium additions has been investigated. A considerable refinement of ferrite grain size can be produced, causing thereby an enhancement of the yield strength and a lowering of the transition temperature. (Author)

AD-635 649 **Field 13H, 11C**
CFSTI Prices: HC$1.00 MF$0.50
Institute of Modern Languages, Inc., Washington, D. C.
RECENT DEVELOPMENTS IN THE FIELD OF HIGH-GLOSS ALUMINUM.
by E. Tragner, and G. Kappel. Jul 66, 17p
Contract DA-44-009-AMC-1563 (T)
Proj. DA-1C024401-A328
TT-66-61783, AERDL-T-1852-66
Neuere Entwicklung auf dem Gebiet der Aluminum-Glanzwerk-Stoffe. Trans. of Aluminum (West Germany) v36 n5 p267-71 May 1960.

Descriptors: (*Aluminum, Brightness), (*Anodic coatings, Aluminum), West Germany, Aluminum alloys, Magnesium alloys, Precision finishing, Reflection, Foils, Surface properties.

The reflectal materials for bright anodizing, made from 99.99% Al, have given excellent results in the most diverse applications with respect to gloss and reflectance; in recent times, however, attempts are being made for economic reasons, to replace these high-purity alloys by less pure and thus cheaper materials, e.g., on basis of Al 99.9 (remiral) or even 99.8/99.85. The improvement of the bright anodizing methods and the many years of experience gained by the processors of these materials have made such a replacement feasible. It must be remembered, however, that an increase in the impurity level makes the achievement of high, uniform gloss more difficult, particularly under actual production conditions, so that compromises with regard to the brightness characteristics, particularly for large, plane surfaces, must be accepted. (Author)

AD-635 672 **Field 13H**
CFSTI Prices: HC$2.00 MF$0.50
Battelle Memorial Inst., Columbus, Ohio.
THE CASTING AND POWDER-METALLURGY FORMING OF PRECIPITATION-HARDENABLE STAINLESS STEELS.
by J. G. Kura, V. D. Barth, and H. O. McIntire. 20 Apr 66, 50p
Contract DA-01-021-AMC-11651 (Z)
NASA-TM-X-53444, RSIC-491

Descriptors: (*Powder metallurgy, Stainless steel), (*Casting, Stainless steel), (*Stainless steel, Dispersion hardening), State-of-the-art reviews, Heat treatment, Sintering, Powder metallurgy.

The state of the art of making shapes of precipitation-hardenable stainless steels by methods other than machining from wrought materials is reviewed. The methods reviewed are casting and powder metallurgy. Of these methods, only casting is extensively practiced. Powder metallurgy is a promising procedure for 17-4 PH stainless, but techniques are not well advanced for handling the grades that contain titanium or aluminum such as PH 15-7 Mo and A-286. (Author)

AD-635 673 **Field 13H, 13J**
CFSTI Prices: HC$2.00 MF$0.50
Naval Ordnance Test Station, China Lake, Calif.
DEVELOPMENT OF FILMLESS TECHNIQUE FOR RECORDING DEFECTS IN SHIP WELDS.
Progress rept. no. 1.
by J. I. Bujes. 25 Feb 57, 41p
Proj. SR-140
SSC-104
Previously announced Jun 60 as PB-137 557, LCmi$3.30, phS7.80.

Descriptors: (*Welds, *Non-destructive testing), (*Radiography, Recording devices), Ship plates, Defects (Materials), Gamma rays, Geiger counters, Scintillation counters, Steel, Crystal counters.

An investigation was made of the feasibility of a direct-reading or filmless technique in radiography using a 300 mC Cobalt-60 source and a Geiger counter scintillator, and CdS or SeS crystals as detectors on a 1-in. thick steel welded test plate. A sketch and a radiograph of the welded test plate are shown. At present, the scintillator is the most useful detector of gamma radiation. (Author)

AD-635 755 **Field 13H, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Pitman-Dunn Research Labs., Frankford Arsenal, Philadelphia, Pa.
INVESTMENT CASTING OF MAGNESIUM-LITHIUM ALLOYS.
Memo rept.
by Anthony Saia, and Ralph E. Edelman. Jun 66, 19p
Proj. DA-1C204401A328
FA-M66-25-1

Descriptors: (*Casting, *Magnesium alloys), Lithium alloys, Silicon alloys, Silver alloys, Zinc alloys, Casting alloys, Tensile properties, Castings, Microstructure, Surface properties.

Identifiers: Magnesium alloy 14Li 0.5Si, Magnesium alloy 3Ag 14Li 2Si 5Zn.

A method was developed for investment casting magnesium-lithium alloys into inhibited gypsum-bonded molds. Both prototype castings and separately cast test bars (0.252 inch) were produced. Visual and metallographic examination showed no evidence of metal-mold reaction. Tensile property data were obtained on two previously developed alloys, Mg-14Li-0.5Si and Mg-14Li-5Zn-3Ag-2Si. The strength level and the ductility of the investment-cast test bars were found to correspond with previously measured properties obtained on bars cast into a permanent steel mold (0.505 inch). (Author)

AD-635 870 **Field 13H, 9A**
CFSTI Prices: HC$7.00 MF$1.75
Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
ELECTRON BEAM TECHNIQUES FOR FABRICATION AND ASSEMBLY OF PARTS FOR ELECTRON TUBES.
Final technical rept. 1 Jul 63-31 Mar 66.
by M. L. Kohn. 31 Mar 66, 369p EBR-187
Contract DA-36-039-AMC-03625 (E)
See also AD-630 001.

Descriptors: (*Electron tube parts, Manufacturing methods), (*Electron beam welding, Electron tube parts), (*Machining, Electron beams), Electron tubes, Processing, Quality control, Life expectancy, Performance (Engineering), Welds.

An investigation was made of electron beam welding and drilling of materials in combinations and thicknesses which could normally be expected to be encountered in the manufacture of electron tubes. An analysis was made of two electron tubes, types 6544 and 6914, in order to choose joints to be electron beam welded. The efforts concerning the performance of preproduction and pilot line manufacture of these tubes are presented.

AD-636 106 **Field 13H**
CFSTI Prices: HC$9.15 MF$2.50
Metcut Research Associates, Inc., Cincinnati, Ohio.
LOGISTICS MACHINING DATA
AMC Pamphlet.
24 May 66, 614p
Contract DA-11-070-AMC-224 (W)
AMC-P-700-1

Descriptors: (*Machining, Handbooks), Cutting tools, Cutting fluids, Economics, Surfaces, Automation, Standards, Operation.

Contents: Machining operations; tool geometry; cutting fluids; electrical, chemical, special mechanical and optical machining processes; supplemental machining data and information; economics in machining; instructions in machining; surface finish; numerical control; machining standards; sources of machining data.

AD-636 180 **Field 13H, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Materials Advisory Board, NAS-NRC, Washington, D. C.
SUMMARY REPORT OF THE REFRACTORY METALS SHEET ROLLING PANEL.
Final rept., Jun 59-Dec 65.
Jun 66, 23p MAB-212A-M
Grant DA-49-083-0SA-313

Descriptors: (*Refractory metal alloys, Sheets), (*Rolling (Metallurgy), Refractory metal alloys), Refractory metals, Molybdenum alloys, Niobium alloys, Tantalum alloys, Tungsten alloys, Mechanical properties, Coatings, Corrosion inhibition, Pipes.

The method of operation, accomplishments, and recommendations of the Panel are outlined (summarizing the contents of MAB-212-M, 'Final Report of the Refractory Metals Sheet Rolling Panel'). (Author)

AD-636 191 **Field 13H, 11F**
CFSTI Prices: HC$2.00 MF$0.50
Institute of Modern Languages, Inc., Washington, D. C.
EXTRUSION OF AlMgSi ALLOYS.
by G. E. Gardam, F. Booth, K. W. Gunn, D. L. W. Collins, and D. W. Evans. Jul 66, 40p
Contract DA-44-009-AMC-1563 (T)
Proj. DA-1C02440A-328
ERDL-T-1851-66, TT-66-61852
Strangpressen von AlMgSi - Legierungen, trans. of Aluminium (West Germany) n4 p207-21 1962.

Descriptors: (*Aluminum alloys, *Extrusion), Magnesium alloys, Corrosion resistance, West Germany, Mechanical properties, Phase studies, Impurities, Anodic coatings, Surfaces, Silicon alloys.

Contents: Influence of the composition and structure on the behavior of aluminum-magnesium-silicon alloys on surface treatment, resistance to corrosion of aluminum-magnesium-silicon alloys; influence of the composition on the mechanical

properties of aluminum-magnesium-silicon alloys; the behavior of aluminum-magnesium-silicon alloys according to the phase diagram.

AD-636 210 **Field 13H, 11F, 11C**
CFSTI Prices: HC$1.10 MF$0.50
Naval Air Material Center, Philadelphia, Pa. Aeronautical Materials Lab.
PLATING CHARACTERISTICS OF TRIETHANOLAMINE/CADMIUM PLATING BATHS.
by Edward Taylor. 9 Jun 61, 6p NAMC-AML-1198
Task 05-010/200-1/R007-08-002

Descriptors: (*Amines, Electroplating), (*Metal coatings, *Cadmium), (*Electroplating, Cadmium), Amino acids, Cyanides, Methanols, Fatty acids, Adhesion, Steel, Hydrogen embrittlement.

Identifiers: Triethanol amines.

Based on the experimental work described in the report, the following conclusions have been reached: Whereas the cadmium plated from a cyanide bath passed the two unspecified adhesion tests and Federal Specification QQ-P-416a, using one of the best commercial pretreatments, the platings from the other baths did not pass the same testing conditions even though the identical pretreatment was used. The aqueous triethanolamine bath seemed to be relatively difficult to prepare and even more difficult to maintain and recondition. The methanol base-triethanolamine bath had a very high resistance and required high voltages to obtain significant current densities. The glycinate and butyrate baths require considerable maintenance and do not produce coatings comparable in performance with those from a cyanide bath. (Author)

AD-636 258 **Field 13H, 13J, 9B**
CFSTI Prices: HC$4.00 MF$0.75
David Taylor Model Basin, Washington, D. C. Applied Mathematics Lab.
INITIAL APPLICATIONS OF APT PART PROGRAMMING TO SHIPBUILDING.
Summary rept. Mar 64-Sep 65.
by Wayman Braxton, and Benny Wallis. Jun 66, 116p
Proj. S-R003-08-01
DTMB-2157

Descriptors: (*Machine tools, Automation), (*Ship structural components, Production), Programming (Computers), Programming languages, Production control, Control systems, Cutting tools.

Identifiers: Automatically programmed tools.

Use in shipbuilding of the APT III part programming language, distributed by the Research Institute of the Illinois Institute of Technology, is illustrated. Information is also given about the APT language. Formats and functions of the Gecent Postprocessor instructions, prepared by the General Electric Co., are also presented to show the controls necessary for cutting ship parts using a Linde CM-70 Telerex flame-cutting machine. Numerous applications of these tools to shipbuilding problems are explained and illustrated. (Author)

N66-13171 **Field 13H**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Univ., Calif. Dept. of Statistics.
COMPARISON OF SEVERAL PROCEDURES FOR PROCESS CONTROL.
Technical rept no. 84.
by E. P.-C. Kao. 30 Sep 65, 22p
Contract Nonr-225 (53)
NASA-CR-68505

Descriptors: *Control system, *Statistical analysis, *Distribution function, *Manufacturing, *Probability distribution.

For abstract, see T 66 17.

N66-15726 **Field 13H**
CFSTI Prices: HC$1.00 MF$0.50
National Research Corp., Cambridge, Mass.
DEVELOPMENT OF TECHNIQUES AND HARDWARE FOR INSULATION WRAPPINGS OF CRYOGENIC CONTAINERS.
Quarterly progress rept. no. 8, Aug - Oct 65.
by M. E. Reed. Dec 65, 13p
Contract NAS8-11042
NASA-CR-69538

Descriptors: *Cryogenic storage, *Thermal insulation, *Helium.

N66-15974 **Field 13H**
CFSTI Prices: HC$4.00 MF$1.00
North American Aviation, Inc., Los Angeles, Calif.
EXPERIMENTAL TITANIUM CROSSBEAM MANUFACTURING TECHNOLOGY.
Final rept. 1 Jul 64-30 Oct 65.
12 Nov 65, 129p NA-65-947
Contract NAS8-11768
NASA-CR-69649

Descriptors: *Titanium, *Saturn V launch vehicle, *Sine wave, *Structural beam.

N66-17436 **Field 13H**
CFSTI Prices: HC$2.00 MF$0.50
Pratt and Whitney Aircraft, East Hartford, Conn.
DETERMINATION OF THE EMISSIVITY OF MATERIALS.
Semiannual progress rept. May 15-Nov. 14, 65.
by R. C. Emanuelson, and W. Luoma. 20 Dec 65, 46p PWA-2750
Contract NAS3-4174
NASA-CR-54891

Descriptors: *Inorganic coating, *Particle emission, *Space radiator, *Titanium compound, *Nuclear power plant.

N66-18025 **Field 13H**
CFSTI Prices: HC$3.00 MF$0.75
General Electric Co., Schenectady, N. Y. Advanced Technologu Labs.
EVALUATION OF THIN WALL SPACECRAFT ELECTRICAL WIRING. VOLUME I - TEST METHODS AND FYCILITIES.
Technical rept. no. 1.
by L. J. Frisco, and K. N. Mathes. 28 Jul 65, 87p
Contract NAS9-4549
NASA-CR-65232

Descriptors: *Spacecraft environment, *Wiring system, *Electric wiring, *Environmental testing, *Test method.

N66-18409 **Field 13H**
CFSTI Prices: HC$3.00 MF$0.75
Research and Advanced Development Div., Avco Corp., Wilmington, Mass.
DEVELOPMENT OF A TYPICAL MARS LANDING CAPSULE STERILIZATION CONTAINER.
Quarterly technical progress rept. no. 2, 1 Oct 65-1 Jan 66.
15 Jan 66, 88p RAD-SR-66-14
Contract NAS8-20502
NASA-CR-70589

Descriptors: *Landing module, *Mars probe, *Sterilization, *Structural design.

N66-18443 **Field 13H**
CFSTI Prices: HC$1.00 MF$0.50
Hughes Aircraft Co., Culver City, Calif.
STUDY OF THE EFFECT OF JPL STERILIZATION TECHNIQUES ON THERMAL CONTROL SURFACES.
by P. M. Blair Jr. 15 Dec 65, 25p P65-173
Contract NAS7-100
NASA-CR-70838

Descriptors: *Sterilization, *Control surface, *Metal surface, *Paint, *Temperature control.

N66-18470 **Field 13H**
CFSTI Prices: HC$1.00 MF$0.50
General Dynamics/Convair, San Diego, Calif.
PROPERTIES OF 321 STAINLESS STEEL JOINTS AT ROOM TEMPERATURE AND MINUS 423 DEG F.
by H. F. Greer. 25 Sep 61, 9p Rept. no. 55E-154
Contract NAS3-3232
NASA-CR-54493

Descriptors: *Cryogenic temperature, *Joint, *Room temperature, *Stainless steel.

N66-18473 **Field 13H**
CFSTI Prices: HC$1.00 MF$0.50
General Dynamics/Astronautics, San Diego, Calif.
RADIATION SHIELDING FOR CENTAUR AFT BULKHEAD.
by G. D. Peddie. Oct 64, 21p GD/A-AKM-64-032
Contract NAS3-3232
NASA-CR-54505

Descriptors: *Bulkhead, *Centraur launch vehicle, *Production engineering, *Radiation shielding, *Sandwich construction.

N66-18474 **Field 13H**
CFSTI Prices: HC$1.00 MF$0.50
General Dynamics/Astronautics, San Diego, Calif.
PROCEDURE FOR APPLYING REFLECTIVE VAPOR BARRIER TO POLYURETHANE FOAM INSULATION PANELS.
by G. D. Peddie. Nov 64, 24p GD/A-AKM-64-038
Contract NAS3-3232
NASA-CR-54506

Descriptors: *Barrier layer, *Resin bonding, *Foamed material, *Insulated structure, *Production engineering.

AD-465 284 **See Field 10B**

AD-635 587 **See Field 11B**

AD-635 630 **See Field 11F**

AD-635 635 **See Field 11F**

AD-635 647 **See Field 11C**

AD-635 762 **See Field 13J**

AD-635 763 **See Field 13J**

AD-635 765 **See Field 11F**

AD-635 787 **See Field 13J**

AD-635 791 **See Field 13J**

AD-635 795 **See Field 13J**

AD-635 814 **See Field 9A**

AD-635 858 **See Field 9E**

AD-635 970 **See Field 9A**

AD-636 125 **See Field 12B**

AD-636 193 **See Field 9A**

AD-636 285 **See Field 9A**

PB-170 709 **See Field 11F**

13I. MACHINERY AND TOOLS

AD-635 790 **Field 13I**
CFSTI Prices: HC$2.00 MF$0.50
Franklin Inst. Research Labs., Philadelphia, Pa.

DETERMINATION OF GAS BEARING STABILITY BY RESPONSE TO A STEP-JUMP.
Technical Interim rept.
by H. G. Elrod, Jr. J. T. McCabe, and T. Y. Chu.
Jul 66, 51p I-A2049-27
Contract Nonr-2342 (00)
NR-062-316

Descriptors: (*Gas bearing, Stability), Determination, Films, Dynamics, Numerical analysis.

The stability of a gas bearing is treated by a new procedure in which the bearing film is characterized by its responses to step-jump displacements. Duhamel's theorem is invoked to generalize these step responses in a system of dynamical equation. Stability is determined by calculation of a 'growth factor for each degree of freedom. (Author)

AD-636 094 **Field 13I, 1C, 10A**
CFSTI Prices: HC$2.00 MF$0.50
Naval Air Development Center, Johnsville, Pa. Aero Mechanics Dept.
FEASIBILITY OF A SELF-CONTAINED, TWO-WAY REEL AND POWER SUPPLY UNIT FOR USE IN HIGH-SPEED TOWED TARGETS.
Phase rept.
by George E. Poorman. 29 Jun 66, 45p NADC-AM-6526
Task R360FR102/2021/R011-01-01

Descriptors: (*Reels, *Aerial targets), Towing cables, Hoists, Towed bodies, Ducted fans, Feasibility studies, Air-towed Gas turbines, Energy conversion.

This report presents the results of an investigation to determine the feasibility and practicality of a two-way tow system internal to a towed target. Such a system would permit any aircraft equipped with a simple external-store rack to function as a towing aircraft. The investigation shows that, with a centrifugal fan power unit, the internal tow system is both feasible and practical. Development and evaluation of the system for operational use is recommended. (Author)

N66-15479 **Field 13I**
CFSTI Prices: HC$6.00 MF$1.25
Franklin Inst. Research Labs., Philadelphia, Pa.
A BIBLIOGRAPHY (WITH ABSTRACTS) ON GAS-LUBRICATED BEARINGS.
Interim rept.
by P. Devlin, and A. Peters. Nov 65, 232p I-A2049-25
Contract Nonr-2342 (00)
NASA-CR-69394

Descriptors: *Abstract, *Gas lubricated bearing, *Bibliography.

For abstract, see T 66 17.

N66-16058 **Field 13I**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
EVALUATION OF IMPREGNATED LUBRICANTS IN BALL-BEARING RETAINERS AT 10 MINUS 6 TORR.
by D. C. Glenn, H. W. Scibbe, and L. D. Smith.
Feb 66, 21p NASA-TN-D-3259

Descriptors: *Mineral oil, *Ball bearing, *Impregnated material, *Lubricant, *Polyphenyl ether.

N66-18485 **Field 13I**
CFSTI Prices: HC$3.00 MF$0.50
Aerojet-General Corp., Sacramento, Calif.
DESIGN AND DEVELOPMENT OF LIQUID HYDROGEN COOLED 120MM ROLLER, 110MM ROLLER, AND 110MM TANDEM BALL BEARINGS FOR M-1 FUEL TURBOPUMP.
by C. C. Purdy. 24 Feb 66, 56p AGC-8800-27
Contract NAS3-2555
NASA-CR-54826

Descriptors: *Ball bearing, *Liquid hydrogen, *M-1 rocket engine, *Roller bearing, *Turbopump.

Y-OA-56 **Field 13I**
CFSTI Prices: HC$1.00 MF$0.50
Union Carbide Corp., Oak Ridge, Tenn. Y-12 Plant.
APPLICATION OF NUMERICAL CONTROL TO MACHINE TOOLS.
by K. W. Sommerfeld. 14 Jan 66, 15p
Contract W-7405-eng-26

Descriptors: (*Machine tools, Control systems), (*Numerical methods + procedures, Machine tools).

PB-170 378 **See Field 9E**

13J. MARINE ENGINEERING

AD-635 593 **Field 13J, 11C**
CFSTI Prices: HC$5.60 MF$0.75
Monsanto Research Corp., Everett, Mass. Boston Lab.
PLASTICS FOR HULL VIBRATION DAMPING.
Final rept.
by Lucius Gilman, George L. Ball, and Paul F. Donovan. 15 May 63, 59p MRB1020F, MRC-Bos-Fin-56
Contract NObs-88505
Proj. SF-013-1301
Task 908

Descriptors: (*Damping, Hulls (Marine)), (*Hulls (Marine), Damping), (*Plastic coatings, Hulls (Marine)), Vibration, Molding, Ship plates, Steel, Graphite, Carbon black, Polyvinyl chloride, Polyester plastics.

An improved damping material was developed that more than meets the Bureau of Ships specifications for damping of steel plate 3/8 in. thick. Designated 'Improved MRC-OG4,' it is a graphite/carbon black-filled, plasticized, polyvinyl chloride/acetate copolymer. 'Improved MRC-OG4' yields greater than 9% c/c sub o over 10F and a decade of frequency in addition to providing 3% or more of c/c sub o from 32 to 85F at 0.1 to 6 kcps. Improvement of the MRC-OG4 resulted from an improved processing technique. In addition, commercial extrusion of the MRC-OG4 demonstrated the feasibility of this forming method. The MRC-OG4 formulation was modified to include processing agents. Eight brands or grades of graphite were accepted for use in the 'Improved MRC-OG4.' (Author)

AD-635 656 **Field 13J, 6K, 8A**
CFSTI Prices: HC$2.00 MF$0.50
Naval Submarine Medical Center, Groton, Conn.
SEALAB I: A PERSONAL DOCUMENTARY ACCOUNT.
Memorandum rept.
by Robert E. Thompson. 30 Mar 66, 41p MR-66-9
NAVMED-MF011.99-9003.05

Descriptors: (*Naval research, *Underwater), Naval personnel, Life support, Underwater vehicles, Confined environments, Marine biology, Fishes, Behavior, Oceanographic data, Decompression, Underwater equipment.

Identifiers: Sealab.

The author was the medical officer participant in the group of four men who spent ten days in the underwater habitation designated SEALAB I in July-August 1964. This is a day by day account of the experiences and problems encountered by the author during the preparation for the experiment, beginning on 28 April, and during the actual time underwater and during the ascent to the surface and the period of decompression, terminating on the first of August. This particular submarine-qualified medical officer was chosen for this assignment in the SEALAB I project because of his previous training in the fields of marine biology and diving medicine. This personal account is published at this time as a part of the record of the SEALAB series of projects, which are part of the larger Man-in-the-Sea Program. He describes what they ate, how they slept, details of their sorties into the ocean around them; problems due to contamination of their atmosphere; the fish and marine life observed through their portholes or encountered in their excursions outside the SEALAB; as well as their psychological states, their relationships with each other, and their communications with both the support personnel topside and their families at home. (Author)

AD-635 675 **Field 13J, 20K**
CFSTI Prices: HC$2.00 MF$0.50
Naval Construction Research Establishment, Dunfermline (Scotland).
PEGASUS COMPUTER SPECIFICATIONS: ELASTIC ANALYSIS OF ORTHOGONAL GRILLAGES EXCLUDING TORSIONAL EFFECTS.
by C. S. Smith, and J. L. McKeeman. May 66, 34p NCRE/R.520
NSTIC-06189/66

Descriptors: (*Ships structural components, Stresses), (*Ship plates, Elasticity), Deflection, Beams (Structural), Programming (Computers), Computers, Specifications, Loading (Mechanics).

The report describes a PEGASUS program for calculating the deflections and stresses in flat beam grillages under lateral loading. By confining the analysis to orthogonal grillages and excluding torsional effects, provision was made for analysing grillages with up to 72 intersections. The effects of shear deflection are included. (Author)

AD-635 762 **Field 13J, 13H, 11F**
CFSTI Prices: HC$1.50 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.
EVALUATION OF IMPROVED MATERIALS AND METHODS OF FABRICATION FOR WELDED STEEL SHIPS.
Progress rept.
by R. W. Bennett, R. G. Kline, M. Forman, P. J. Rieppel, and C. B. Voldrich. 15 Nov 49, 96p
Contracts NObs-45543, NObs-50148
Proj. SR-100
SSC-33
See also AD-635 791.

Descriptors: (*Ship hulls, Welds), (*Steel, Ship plates), Welding, Transition temperature, Merchant vessels, Carbon alloys, Welding rods, Fracture (Mechanics), Tests, Ductility.

This report covers tests made on the project steels using various modifications of the test specimens employed in the work described by the first progress report and with notched tension specimens. It was the object of these modifications to obtain the same transition temperatures for the project steels that were obtained from the full-scale hatch-corner test specimens studied at the University of California. Other tests of all-weld-metal specimens and specimens welded with E6020 electrodes are included. A few preliminary observations on the initiation of fracture in the test specimens used are described.

AD-635 763 **Field 13J, 11F, 13H**
CFSTI Prices: HC$3.00 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF MEANS FOR EVALUATING THE QUALITY OF HULL PLATE STEEL BY TESTS CONDUCTED ON FURNACE OR LADLE SAMPLES.
Progress rept.
by W. G. N. Heer, S. A. Herres, and C. H. Lorig.
15 Oct 47, 56p

Contracts NObs-45030, NObs-34231
Proj. SR-97
SSC-12
See also AD-635 787.

Descriptors: (*Steel, Notch sensitivity), (*Ship plates, Steel), Ship hulls, Impact tests, Deoxidation (Metallurgy), Aging (Materials), Rolling (Metallurgy), Test methods.

A simple but reliable method for evaluating the notch sensitivity of hull steel before the steel has been rolled into plate was sought. Several series of both the low- and high-silicon steels were made both with and without aluminum deoxidation and tested by standard V-notch Charpy impact tests and by a round Charpy impact bar, which was developed to save machining time and cost. Notched-bar impact values of the high-silicon steels with or without aluminum deoxidation, are low and not significantly different. A marked superiority of the aluminum-killed steels is apparent when these steels are properly normalized and also when these or the low-silicon steels are hot rolled at proper temperatures. Specimens hot rolled and then subjected to strain aging show a further decrease in notched-bar impact resistance of the non-aluminum as compared with the aluminum-killed steels. A series of notched-bend bar tests qualitatively indicated the same trends by fracture appearance and manner of breaking, but no quantitative evaluations were obtained from static bend tests. (Author)

AD-635 764 **Field 13J, 11F**
CFSTI Prices: HC$4.00 MF$0.75
Swarthmore Coll., Pa.
THE EFFECTS OF WIDTH AND THICKNESS ON STRENGTH, ENERGY ABSORPTION AND TRANSITION TEMPERATURE FOR INTERNALLY NOTCHED FLAT STEEL PLATES.
Progress rept.
by Samuel T. Carpenter, Wendell P. Roop, A. W. Zell, and E. Kasten. 15 Nov 51, 86p
Contracts NObs-45521, NObs-50148
SSC-44
See also PB-99 867.

Descriptors: (*Steel, *Fracture (Mechanics)), Metal plates, Ship hulls, Thickness, Transition temperature, Stresses, Loading (Mechanics), Experimental data, Ship plates, Ductility.

This report contains the results of tensile tests made on geometrically similar steel specimens. Tests were made in a systematic manner with Aspect Ratios (width divided by thickness) varying from 4 to 20. Each specimen was internally notched with a central transverse notch having a length equal to 1/4 of the width of the specimen. The ends of the notches terminated with a drilled hole. The diameter of the drilled holes was made proportional to plate thickness. Steel plates ranging in 'as rolled thicknesses', from 1/2 inch to 1 1/2 inch were investigated from two heats of steel. The results of the tests are classified on the basis of strength, energy absorption, and transition temperature. It was found from this investigation that dimensional similarity of specimens does not assure geometrical similarity of plastic strain patterns. Therefore, the geometrical and metallurgical effects of thickness on transition temperature could not be segregated on the basis of geometrically similar specimens in this investigation. (Author)

AD-635 766 **Field 13J, 11F**
CFSTI Prices: HC$6.00 MF$1.00
Pennsylvania State Univ., University Park. Mineral Industries Experiment Station.
CORRELATION OF LABORATORY TESTS WITH FULL SCALE SHIP PLATE FRACTURE TESTS: ANALYSIS OF TRUE-STRESS TRUE-STRAIN DATA ON PROJECT STEELS.
Progress rept.
by E. P. Klier, J. O. Mack, F. C. Wagner, and M. Gensamer. 21 Jun 50, 193p
Contracts NObs-31217, NObs-50148
Proj. SR-96
SSC-19
See also AD-635 794.

Descriptors: (*Ship plates, Steel), (*Steel, Fracture (Mechanics)), Ship hulls, Rheology, Strain (Mechanics), Stresses, Transition temperature, Tensile properties.

The results of a study of the flow and fracture strengths of the project steels was considered. It appears that the flow- and fracture- strength concept of failure proposed by Ludwik is not adequate to account for the results obtained. The flow properties of the steels was studied as a function of temperature and prestrain. The test results were found to be adequately described by the expression, sigma = sigma sub o delta to the n power, in which sigma and delta are respectively true stress and natural strain, while sigma sub o and n are constants. Sigma sub o has been found to vary regularly with temperature while n has been found to undergo a transition for most of the steels at sufficiently low temperatures. Both sigma sub o and n appear to have fundamental significance and should ultimately be correlated in some manner with the engineering properties of the steels. (Author)

AD-635 769 **Field 13J, 11F**
CFSTI Prices: HC$2.00 MF$0.50
Trojan Power Co., Allentown, Pa.
DIRECT EXPLOSION TEST FOR WELDED ARMOR AND SHIP PLATE PRIME AND WELDED PLATE TESTS.
Final rept.
by William A. Snelling. 30 Aug 46, 33p
Contracts NObs-31223, NObs-34231
SSC-4
Previously announced 11 Feb 47 as PB-48639, LCmi$1.00, phS2.00.

Descriptors: (*Ship plates, Steel), (*Steel, Shock resistance), Ship hulls, Shock (Mechanics), Welds, Stress relieving, Tests, Armor plate, Failure (Mechanics), Explosions.

The direct explosion test has been utilized to determine the relative resistance of welded and unwelded specimens to shock loading. The tests were conducted using a special explosive which is detonated in direct contact with the specimen under controlled conditions. Repetitive tests have demonstrated the excellent reproducibility of the test. (Author)

AD-635 783 **Field 13J, 20D**
CFSTI Prices: HC$4.00 MF$0.75
David Taylor Model Basin, Washington, D. C. Hydromechanics Lab.
TWO-DIMENSIONAL EXPERIMENTS ON THE EFFECT OF HULL FORM ON HYDRODYNAMIC IMPACT.
Final rept.
by Margaret D. Ochi, and Frank M. Schwartz.
May 66, 76p
Proj. S-R009-01-01
Task 0100
DTMB-1994

Descriptors: (*Water entry, Impact tests), (*Ship hulls, Water entry), Fluid dynamic properties, Model tests, Pressure, Impact shock, Force (Mechanics), Surfaces, Velocity.

Identifiers: Slamming impact.

An extensive experimental study was undertaken to evaluate the fundamental parameters affecting the two-dimensional water-entry problem. The effects of ship forebody form, impact velocity, and mass on the magnitudes and time histories of impact pressures were determined and results compared with theoretical predictions. It was found that the theory predicts pressure, force, and impulse that show reasonable agreement with experimental results for sections having fine form, i.e., those of relatively V-form with small flat bottom. However, there is increasing divergence between experimental results and theoretical predictions for relatively blunt forms with large flat bottoms. (Author)

AD-635 785 **Field 13J, 11F**
CFSTI Prices: HC$2.00 MF$0.50
Swarthmore Coll., Pa.
A STUDY OF PLASTIC DEFORMATION AND FRACTURING BY STRAIN ENERGY DISTRIBUTION. INTERNALLY-NOTCHED STEEL PLATES UNDER TENSION.
Progress rept.
by S. I. Liu, and Samuel T. Carpenter. 20 Dec 50, 45p
Contracts NObs-45521, NObs-50148
Proj. SR-98
SSC-38
See also AD-635 786.

Descriptors: (*Ship plates, Steel), (*Steel, Fracture (Mechanics)), Deformation, Ship hulls, Strain (Mechanics), Theory.

This investigation was conducted to study the plastic deformation and fracturing of 12in. wide, 3/4in. thick internally notched steel plates under axial tension by determining the strain energy distribution on the surface of the deformed regions of the plates. Several stages in the process of deformation and fracturing at 70F and 10F were investigated to maximum load, 70F being above the transition temperature, and 10F being below the transition temperature. Surface strain energy distribution across the crack was also determined for a specimen fractured ductilely at 70F. The results of this investigation show that the total energy based on octahedral theory and the above-stated assumptions agrees very well with the total observed energy input; that the rate of propagation of plastic deformation with respect to energy input decreases with decreasing temperature; that, for specimens with two dimensional similarity and constant thickness, the total energy of individual specimens of varying width can be predicted by the strain energy distribution of a single specimen of proper width; and that, at room temperature, the unit strain energy at the crack is found to be approximately in the order of 30,000 in-lbs per cubic inch in a ductile specimen. (Author)

AD-635 786 **Field 13J, 11F**
CFSTI Prices: HC$1.50 MF$0.75
Swarthmore Coll., Pa.
CRACKING OF SIMPLE STRUCTURAL GEOMETRIES: THE EFFECTS OF EDGE NOTCH GEOMETRY ON FLAT STEEL PLATES.
Progress rept. no. 1.
by Samuel T. Carpenter, and Roy F. Linsenmeyer. 12 May 52, 90p
Contract NObs-50250
Proj. SR-118
SSC-51
See also AD-635 785.

Descriptors: (*Ship plates, Steel), (*Steel, Fracture (Mechanics)), Ship hulls, Transition temperature, Tensile properties, Notch toughness.

This report covers an investigation to determine the relative cracking tendency of simple geometries common to ship structures and presents the results of tensile tests on edge notch specimens. The edge notched specimens were 15in wide by 40in long and prepared from 3/4in thick Dn steel. The edge notching consisted of notches at the midlength of the specimen and notches separated by a reduced width portion. The results of the tests are classified on the basis of strength, energy absorption and transition temperatures. The results indicate that there is no marked difference in transition temperature for the various types of edge notches, which included a jeweler's hack saw cut at 90 to the plate edge, a similar flame cut notch, flame cut notches with various included angles, flame cut semi-circles, and notches similar to the foregoing but having an elongated reduced width section. There is, however, a considerable difference in the action of the specimens with regard to strength and energy absorption. (Author)

AD-635 787 **Field 13J, 11F, 13H**
CFSTI Prices: HC$3.00 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.

INVESTIGATION OF MEANS FOR EVALUATING THE QUALITY OF HULL PLATE STEEL BY TESTS CONDUCTED ON FURNACE OR LADLE SAMPLES.
Final rept.
by J. A. Davis, S. A. Herres, C. T. Greenidge, and C. H. Lorig. 30 Nov 48, 54p
Contracts NObs-45030, NObs-34231
Proj. 97
SSC-20
See also AD-635 763.

Descriptors: (*Steel, Notch sensitivity), (*Ship plates, Steel), Ship hulls, Impact tests, Deoxidation (Metallurgy), Test methods, Rolling (Metallurgy).

A simple but reliable method for evaluating the notch sensitivity of hull plate steel before the steel has been rolled into plate was sought. Tests made on cast ladle samples from open hearth heats verified the results obtained on laboratory steels which showed that small hot-worked ladle samples will distinguish relatively large differences in the notched-bar impact resistance of hull plate steels. Correlation between the deoxidation practice and the notched-bar impact properties was obtained for both the commercially rolled plate and the hot-worked ladle samples although the actual impact values for the ladle samples were higher than for the plate samples. The Walker Wedge-impact test was investigated as a possible method for evaluating the quality of hull plate steel on samples poured from the furnace or ladle. The Walker wedge test was not sufficiently sensitive to distinguish a difference in impact resistance between an aluminum-killed steel and a silicon-killed steel when each was either in the as-cast or normalized condition. Notched-bar impact tests showed an appreciable difference in the impact resistance of these two steels. When the as-cast surface was removed by grinding, normalized wedges free from defects failed to break at a testing temperature of minus 80F.

AD-635 791 **Field 13J, 13H, 11F**
CFSTI Prices: HC$3.00 MF$0.75
Case Inst. of Tech., Cleveland, Ohio.
THE FUNDAMENTAL FACTORS INFLUENCING THE BEHAVIOR OF WELDED STRUCTURES UNDER CONDITIONS OF MULTIAXIAL STRESS, AND VARIATIONS OF TEMPERATURE, STRESS CONCENTRATION, AND RATES OF STRAIN.
Technical progress rept.
by L. J. Klingler, L. J. Ebert, and W. M. Baldwin Jr. 28 Nov 49, 62p
Contracts NObs-45470, NObs-50148
SSC-34
See also AD-635 762.

Descriptors: (*Ship hulls, *Welds), (*Steel, Ship plates), Welding, Ductility, Heat treatment, Carbon alloys, Merchant vessels, Transition temperature, Microstructure.

An investigation was made to determine the dependence of zones of low ductility in weldments upon the steel and upon the welding conditions and heat treatment. The ductility was evaluated by means of eccentric notch-bar tension tests conducted at various low temperatures. A zone of low ductility was found in two low carbon ship plate steels at a distance of 0.3 - 0.4 in from the weld centerline when the weldments were made with 100F preheat and interpass temperature. A 400F preheat and interpass temperature improved the ductility in the critical zone, lowering the transition temperature from -20F to -45F. A 1100F postheat practically eliminated the zone of lowered ductility, the transition temperature being lowered to -70F. Temperature measurements made during welding showed that the embrittled region was not heated above the lower critical temperature. No change in microstructure could be noted between the critical zone and the unaffected base plate. Microhardness tests showed only slight hardening in the embrittled region. The occurrence of the embrittled region is thought to be due to some subcritical temperature phenomena which may be the supersaturation and precipitation of carbon or carbides from the alpha phase. (Author)

AD-635 792 **Field 13J**
CFSTI Prices: HC$5.60 MF$0.50
Columbia Univ., New York.
A STUDY ON THE STRUCTURAL ACTION OF SUPERSTRUCTURES ON SHIPS.
by Hans H. Bleich. 21 Dec 51, 56p
Contract NObs-50538
SSC-48

Descriptors: (*Ship hulls, Stresses), (*Ship decks, Stresses), Structural parts, Deflection, Strain (Mechanics), Load distribution, Aluminum, Mathematical analysis.

Starting from the assumption that the hull and the deck house may be considered as beams, to each of which, separately, Navier's hypothesis is applicable, the report gives expressions for the deflections and stresses in the hull and deck house assuming constant section of hull and house; it is shown that the theoretical stress distributions found are of the type observed in the tests. The results of this theory concerning the stresses in the mid-ship section can be arranged in simple tables which permit the prediction of the deviation from the conventionally assumed straight-line stress distribution. The method is equally applicable if a part or all of the deck house consists of aluminum.

AD-635 793 **Field 13J, 11F**
CFSTI Prices: HC$2.00 MF$0.50
Pennsylvania State Univ., University Park. Mineral Industries Experiment Station.
CORRELATION OF LABORATORY TESTS WITH FULL SCALE SHIP PLATE FRACTURE TESTS.
Progress rept.
by C. Wagner, and E. P. Klier. 20 Oct 48, 30p
Contracts NObs-31217, NObs-34231
Proj. SR-96
SSC-22
See also AD-675 766.

Descriptors: (*Ship plates, Steel), (*Steel, Fracture (Mechanics)), Ship hulls, Transition temperature, Tensile properties.

The report summarizes the work done on a series of edge-notched tensile bars prepared from the project steels. Evidence is presented to show that for the test specimen used, reasonable agreement exists between the transition temperatures obtained on the basis of per cent fibrous fracture and the transition temperatures for the large plate tension tests. It is further shown that there is lack of agreement between transition temperatures based on fracture appearance and transition temperatures based on energy absorption for this test. Lateral contraction measurements and total elongation measurements are given and show general conformity with energy absorption measurements, although much scatter of the data precludes a strict comparison. (Author)

AD-635 794 **Field 13J, 11F**
CFSTI Prices: HC$6.00 MF$0.75
Pennsylvania State Univ., University Park. Mineral Industries Experiment Station.
CORRELATION OF LABORATORY TESTS WITH FULL SCALE SHIP PLATE FRACTURE TESTS: A STUDY OF STRAIN GRADIENTS.
Progress rept.
by E. P. Klier, F. C. Wagner, J. L. Fisher, and M. Gensamer. 8 Jun 49, 84p
Contracts NObs-31217, NObs-34231
SSC-17
See also AD-635 766.

Descriptors: (*Ship plates, Steel), (*Steel, Fracture (Mechanics)), Ship hulls, Strain (Mechanics), Hardness, Metallography, Surfaces.

Strain gradients normal to fracture surfaces were determined. These fracture surfaces were developed under the following conditions of test: (1) V-notch Charpy bars broken by impact at various locations within the transition zone, (2) V-notch Charpy bars bent, but not completely broken, by impact above the transition temperature, (3) slow bend Schnadt type bars broken below the transition temperature, and (4) 72-inch wide, center notch, tensile specimens broken with ductile and brittle behavior. The strain gradients were studied by means of hardness tests, metallographic methods and X-ray analysis. It is concluded that true cleavage separation is not accompanied by a measurable strain gradient but most 'brittle' or 'cleavage' fractures, so classified on the basis of gross appearance, contain some areas separated by a shear mechanism. (Author)

AD-635 795 **Field 13J, 11F, 13H**
CFSTI Prices: HC$2.00 MF$0.50
California Univ., Berkeley.
CAUSES OF CLEAVAGE FRACTURE IN SHIP PLATE, TESTS OF RESTRAINED WELDED SPECIMENS AND HATCH CORNER SPECIMENS OF MILD STEEL.
Progress rept.
by Alexander Boodberg, and Earl R. Parker. 19 Aug 49, 44p
Contracts NObs-31222, NObs-34232
SSC-27
See also AD-635 108.

Descriptors: (*Ship plates, *Welds), (*Steel, Fracture (Mechanics)), Ship hulls, Transition temperature, Stresses, Tensile properties.

This report summarizes the results of a series of tests conducted on the behavior of high yield strength structural steels. The results of the tests on two sizes of large restrained welded specimens indicated that the width and height of this type of specimen apparently had little or no effect on the transition temperature. The results of the tests performed on notched plate specimens showed that the transition temperatures determined by tests of the two sizes of this type of specimen were in good agreement with each other, but that the transition temperatures as determined by notched plate tests were considerably lower than those obtained with large restrained welded specimen tests. Tension tests of simple welded flat plate specimens indicated that the transition temperatures of the steels were not materially affected by the introduction of a single longitudinal weld along the loading axis or by the presence of two intersecting welds at the center of the unnotched plate specimen.

AD-635 797 **Field 13J, 11F**
CFSTI Prices: HC$3.00 MF$0.75
Swarthmore Coll., Pa.
TWELVE INCH FLAT PLATE TESTS (PART I). ASPECT RATIO PROGRAM (PART II).
Progress rept.
by Samuel T. Carpenter, Wendell P. Roop, Ewald Kasten, and Adolph Zell. 15 Dec 49, 56p
Contracts NObs-45521, NObs-50148
Proj. SR-98
SSC-35
Rept. on Tension Tests of Flat Internally-Notched Plates. See also AD-635 172.

Descriptors: (*Steel, Fracture (Mechanics)), Metal plates, Ship plates, Ship hulls, Transition temperature, Loading (Mechanics), Tensile properties.

Part I of this report states the test results for the following steels: W, S-9, S-12, and S-22. The tests of Part I are tension tests run at various temperatures on specimens 24 in long, 12 in wide and 3/4 in thick, having a central internal notch one-quarter of the width of the plate with ends of the notch 0.010 inch wide made by a jeweler's hack-saw. The load was applied in the direction of rolling. The report contains tables giving the load at first visible crack, at maximum load, and at the failure load, together with the energies computed to these

loads. Load elongation curves for each specimen tested are included, together with diagrams showing maximum load, vs. temperature and diagrams showing energy to maximum load vs. temperature. The character of the fracture as determined by the percentage of shear failure is also given. The transition temperature zones of these steels on the basis of both energy considerations and the mode of the fracture are reported. Part II of this report describes the aspect ratio program now under way to determine the effect of plate width and thickness on transition temperature. (Author)

AD-635 871 **Field 13J, 11F**
CFSTI Prices: HC$9.60 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.
AN INVESTIGATION OF THE INFLUENCE OF DEOXIDATION AND CHEMICAL COMPOSITION ON NOTCHED-BAR PROPERTIES OF SEMIKILLED SHIP STEEL.
Progress rept. no. 2.
by R. H. Frazier, F. W. Boulger, and C. H. Lorig.
28 Nov 52, 101p
Contracts NObs-53239, NObs-50148
Projs. SR-110, NS-011-078
SSC-53
Proj. NS-731-036, See also AD-635 791.

Descriptors: (*Ship plates, Steel), (*Steel, Fracture (Mechanics)), Deoxidation (Metallurgy), Ship hulls, Transition temperature, Tensile properties, Temperature, Impact tests, Rolling (Metallurgy), Temperature, Carbon alloys, Manganese alloys, Silicon alloys, Titanium alloys, Zirconium alloys, Aluminum alloys, Nitrogen, Welds, Grain structures (Metallurgy).

Formulas for calculating tensile properties and notched-bar transition temperatures were developed from data obtained on a comprehensive series of experimental steels. For a particular strength level, steels with higher manganese-carbon ratios have lower transition temperatures. The influence of nitrogen in raising the strength and transition temperature of semikilled steel was studied. Heats treated with zirconium in amounts ranging from 0.06 to 0.10 per cent were made and tested. Small additions of aluminum to steels with low silicon contents usually lowered the tear-test and Charpy transition temperatures. The presence of titanium in excess of 0.02 per cent seems to increase the transition temperature of both Type A and Type B type ship plate. Increasing the ferritic grain size of a particular steel by austenitizing at increasingly higher temperatures raises the transition temperature.

AD-635 938 **Field 13J, 20D**
CFSTI Prices: HC$2.00 MF$0.50
Hydronautics, Inc., Laurel, Md.
HIGHER ORDER WAVE THEORY FOR SLENDER SHIPS.
Technical rept.
by B. Yim. Feb 66, 44p TR-503-1
Contract Nonr-4677 (00)

Descriptors: (*Ships, *Water waves), Slender bodies, Theory, Fluid dynamic properties, Mathematical analysis, Integral equations, Series.

The free surface condition of the surface wave is considered on the free surface itself instead of the mean free surface, by the use of a coordinate transformation, together with the scheme of a systematic expansion in a small parameter. Thus a higher order ship wave theory is developed. The most common practical case of a slender ship with an almost flat bottom is especially treated in detail. The lowest order result is the same as that given Michell's theory. The next higher order potential and wave resistance are derived explicitly. (Author)

AD-635 979 **Field 13J, 5H**
CFSTI Prices: HC$8.75 MF$2.50
North American Aviation, Inc., Anaheim, Calif.
OPTIMUM UNDERWATER MANIPULATOR SYSTEMS FOR MANNED SUBMERSIBLES.
Final study rept.
by F. J. Hetlinger. 31 Mar 66, 550p C6-65/32
Contract NObs-92401
Proj. SF013-01-14
Task 11376

Descriptors: (*Underwater vehicles, *Positioning devices (Machinery)), (*Man-machine systems, Underwater vehicles), (*Submarines, Control systems), Deep submergence, Oceanographic equipment, Sea rescue equipment, Servomechanisms, Control systems, Lighting equipment, Optical scanning, Marine engineering.

Identifiers: Underwater manipulator systems.

Results of the Optimum Underwater Manipulator System Study are presented. The study has determined the optimum manipulator systems for performing the work tasks required of deep submergence vehicles. The manipulator system, to be effective, must combine the best efforts of the operator, the control system, the means of visual observation, the lighting, and the mechanical arm itself; and the manipulator system is therefore defined as the combination of these elements. This report defines the interfaces between the manipulator systems and the vehicles, and provides a body of information that can be used as a basis for the design of integrated vehicle-manipulator systems. Detailed performance specifications and concept plans, defining recommended manipulator systems for five vehicles, are presented. The report also includes the results of state-of-the-art surveys, analyses, and experimental tests of manipulator systems, subsystems, and components. (Author)

AD-636 178 **Field 13J, 13A, 20A**
CFSTI Prices: HC$1.00 MF$0.50
Navy Marine Engineering Lab., Annapolis, Md.
REVIEW OF DESIGN PROCEDURES FOR ATTENUATING VENTILATION SYSTEM NOISE ON NAVAL VESSELS.
Research and development rept.
by Clyde A. Morehead. Aug 66, 12p MEL-247/66
Proj. S-F113-11-09
Task 10444

Descriptors: (*Cooling + ventilation equipment, Marine engineering), (*Acoustic insulation, *Marine engineering), Noise, Reduction, Design, Ventilation, Ship noise, Ventilation ducts, Sound transmission.

A procedure for designing ventilation systems for naval vessels is needed. It should contain the results of the latest research in the area of air conditioning and ventilation noise. An investigation of this was made with the objective of producing a comprehensive design guide. It was concluded from the results of a literature search and conferences with designers of naval vessel ventilation systems that the Naval Applied Science Laboratory (NASL) 'Report of Development of Estimating Method for Predicting Noise Originating in Air Conditioning Systems on Naval Vessels' provides a design guide that will generally satisfy the shipbuilder's need. The NASL report, however, lacks a procedure for predicting the amount of noise transmitted through the walls of a duct into the space through which the duct passes. Designers indicate that in some instances a wall providing higher transmission loss than that now used is needed. This problem is being investigated. (Author)

AD-636 214 **Field 13J**
CFSTI Prices: HC$4.60 MF$0.50
Global Marine Exploration Co., Los Angeles, Calif.
FEASIBILITY STUDY OF THE OUTFITTING OF EXISTING U. S. NAVY VESSELS FOR DEEP OCEAN BOTTOM DRILLING TO 1000 FOOT WATER DEPTHS.
Final rept.
Apr 60, 44p
Contract NBy-3190

Descriptors: (*Ocean bottom, *Drilling), (*Ships, Drilling machines), Naval vessels (Support), Marine engineering, Underwater, Feasibility studies, Portable.

This report investigates the feasibility of outfitting existing U. S. Navy vessels with portable drilling equipment to provide them with limited drilling capability. The feasibility of this undertaking is demonstrated and as a result, the Navy can, with a minimum of vessel alterations and the addition of portable equipment, avail themselves of an extremely versatile tool in the field of underwater construction. To achieve the results herein indicated as both practical and conveniently available, detail engineering and outfitting of a vessel should proceed without interruption if the advantages of this capability are to be realized. (Author)

PB-170 386 **Field 13J**
CFSTI Prices: HC$3.00 MF$0.75
California Univ., Berkeley. Coll. of Engineering.
THE EFFECT OF ENTRAPPED AIR UPON THE SLAMMING OF SHIPS' BOTTOMS.
by Grant Lewison, and Walter M. Maclean. Mar 66, 62p NA-66-5
Contract MA-2620

Descriptors: (*Ships, Motion), Impact shock, Air, Surfaces, Compressible flow, Incompressible flow, Model tests, Pressure, Fluid dynamic properties.

Identifiers: Slamming impact.

Impact between a rigid flat plate and the free surface of water was investigated experimentally and theoretically. Under two-dimensional conditions, the experiments give values of peak pressure of the same order as those recorded on ships slamming at sea, but very much smaller than would be expected from existing theories. New theoretical work is presented which takes account of the air trapped between the model and the water movement. This shows good general agreement with the experiments, though further work is needed to confirm some of the assumptions made. (Author)

PB-170 538 **Field 13J**
CFSTI Price: HC$3.00
Newport News Shipbuilding and Dry Dock Co., Va.
INFLUENCE OF SHIELD CONFIGURATION ON CARGO CAPACITY OF NUCLEAR POWERED SHIPS.
Rept. for 4 Nov 53-4 Nov 55.
by O. H. Klepper. 16 Jan 56, 54p NNSD-NSPS-1108

Descriptors: (*Tankers, Shielding), (*Cargo ships, Shielding), (*Shielding, Configuration), (*Nuclear powered vessels, Shielding), Cargo, Lead, Oils, Nuclear power plants, Boilers.

The purpose of the report is to make a comparison of cargo carrying capacity and approximate gross revenue of (1), a nuclear powered cargo ship and (2), a nuclear powered tanker, using lead, oil, and structure for secondary shielding. It was decided to include a reactor plant with a stand-by oil-fired boiler, and a reactor plant with an oil fired superheater to determine the weight and space requirements for fuel oil shielding.

PB-170 663 **Field 13J, 21F, 5C**
CFSTI Prices: HC$1.50 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Section des Etudes Economiques Generales.
MODELE MATHEMATIQUE DU COUT DE TRANSPORT MARITIME. APPLICATION A LA COMPETITIVITE DU NAVIRE NUCLEAIRE (A Mathematical Model for Cost of Carriage by Sea. Application to Competitiveness of Nuclear Vessels).

by Claude Dorval. May 66, 99p CEA-R-3022
Bilingual English-French Text.

Descriptors: (*Shipping (Marine), Costs), (*Nuclear powered vessels, Economics), (*Marine nuclear propulsion, Costs), Cargo ships, Mathematical models, Reactor fuels, Fuels, Graphics, Submarines, France.

In studying the competitiveness of a nuclear merchant vessel, economic assessments in terms of figures - debatable in the present state of research - have been discarded in favour of a simplified model, which gives a clearer idea of the mechanism of the comparison between alternative vessels and the particular influence of each parameter. An expression is formulated for the unit cost per ton carried over a given distance as a function of the variables - speed and deadweight tonnage - and is used to determine the optima for conventional and nuclear vessels. Competitiveness curves are plotted as a function of the ratios of nuclear and conventional fuel costs and nuclear and conventional marginal power costs. These curves express the limiting values of the above to ratios for which the transport costs of the nuclear and conventional vessels are equal. The competitiveness curves vary considerably according to the hypothesis adopted for the freight market and the limit of tonnage carried annually. The submarine can offer certain advantages (less hydrodynamic resistance from water, possibility of more regular speed and perhaps a shorter route) which make it easier for the nuclear version to be competitive.

AD-458 460 See Field 13M

AD-474 719 See Field 13M

AD-635 585 See Field 5I

AD-635 592 See Field 11F

AD-635 624 See Field 5I

AD-635 625 See Field 5I

AD-635 673 See Field 13H

AD-635 696 See Field 11F

AD-635 765 See Field 11F

AD-636 088 See Field 13M

AD-636 146 See Field 11D

AD-636 147 See Field 15E

AD-636 258 See Field 13H

AD-636 260 See Field 11A

13K. PUMPS, FILTERS, PIPES, FITTINGS, TUBING, AND VALVES

AD-635 828 **Field 13K**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
A METHOD OF MAKING MESH FILTERS FROM MATERIALS AND ALLOYS.
by K. L. Chevashova. 19 May 66, 6p FTD-HT-66-189
Unedited rough draft trans. of Patent (USSR) 134 092, appl. 659186/22, 18 Mar 60.

Descriptors: (*Filters (Fluid), Patents), Metals, Alloys, USSR, Etching, Electrolysis, Hydrochloric acid, Metal films, Foils, Solvent extraction.

The object of the invention is a method of making mesh filters from metals and alloys by selective anode etching, in solutions of hydrochloric acid or its salts, of an initial billet from a foil obtained by rolling or by pressing and sintering metallic powders. To intensify the process and improve the quality of the mesh, electrolysis is conducted under conditions set forth in the disclosure. To obtain a mesh from metals and alloys that cannot be etched (for example, tungsten, molybdenum and tantalum) other metals (for example, zinc, cadmium, iron) that form structural components in the composition of the alloy that are soluble in the selected electrolite are introduced into the composition of the initial billet.

AD-635 956 **Field 13K**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
TRANSIENT RESPONSE TESTS ON SATELLITE POPPET VALVES.
Technical rept.
by K. J. O'Mahony. Mar 66, 19p TR-66109

Descriptors: (*Valves, Attitude control systems), Control systems, Spacecraft, Operation, Gears, Cut-off valves, Jets.

Identifiers: Poppet valves.

The transient response of poppet valves designed for use in satellite gas jet attitude control systems were investigated. Measurements were made at various power levels on the standard form of the valve and also on a slightly modified version designed to operate at a lower power level. Oscillograms of the transient response and a table of results are given in this note. A method of reducing the valve opening time without increasing the steady state power consumption is suggested. Measurements were made on the transient response of this system which involves discharging a capacitor through the torque motor at the instant of thrust demand. The advantages and limitations of this system are briefly indicated. (Author)

N66-17357 **Field 13K**
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
VALVE WITH BALL SEAT SPRING AND ANTI-FLUTTER BAFFLE.
by W. F. MacGlashan Jr. 27 Jul 62, 10p Rept. no. 30-140
Contract NAS7-100
NASA-CR-70378

Descriptors: *Flutter, *Valve, *Flow regulator.

For abstract, see T 66 17.

N66-18434 **Field 13K**
CFSTI Prices: HC$2.00 MF$0.50
Aerojet-General Corp., Sacramento, Calif.
VALVE LIPSEALS M-1 SLEEVE-TYPE THRUST CHAMBER VALVE.
by J. K. Hetrick, and C. G. Linn. 1 Mar 66, 31p AGC-8800-33
Contract NAS3-2555
NASA-CR-54808

Descriptors: *Combustion chambers, *Cryogenic fluid, *Pump seal, *Valve, *Leakage.

N66-18435 **Field 13K**
CFSTI Prices: HC$4.00 MF$1.00
Aerojet-General Corp., Sacramento, Calif.
MECHANICAL DESIGN OF THE M-1 AXIAL FLOW LIQUID HYDROGEN FUEL PUMP.
by P. J. Regan. 15 Feb 66, 148p AGC-8800-18
Contract NAS3-2555
NASA-CR-54823

Descriptors: *Axial flow, *Fluel pump, *Liquid hydrogen.

PB-169 582 See Field 8G

PB-169 583 See Field 8G

PB-169 584 See Field 8G

PB-169 585 See Field 8G

PB-169 587 See Field 8G

PB-169 588 See Field 8G

13L. SAFETY ENGINEERING

AD-477 706 See Field 13M

AD-480 715 See Field 6M

AD-480 716 See Field 6M

13M. STRUCTURAL ENGINEERING

AD-444 624 **Field 13M**
CFSTI Price: HC$1.50
MRD Div., General American Transportation Corp., Niles, Ill.
DESIGN PROCEDURES FOR SHOCK ISOLATION SYSTEMS OF UNDERGROUND PROTECTIVE STRUCTURES. VOLUME I. STRUCTURE INTERIOR MOTIONS DUE TO AIR BLAST INDUCED GROUND SHOCK.
Final technical documentary rept.
by T. Morrison. Jun 64, 234p
Contract AF 29 (601)-4565
Proj. AF-1080
Task 108005
RTD-TDR-63-3096-Vol-1

Descriptors: (*Underground structures, Vibration isolators), (*Vibration isolators, Underground structures), Design, Motion, Shock (Mechanics), Airburst, Soil mechanics.

The report presents methods for estimating appropriate free field waveforms and the influence of soil-structure interaction upon interior structure motion. The inherent error in shock isolation design is at lease plus or minus 20 percent; to reduce this, much more soil test data than is now available will be required. Further, based on purely theoretical arguments, shock isolation per se can be eliminated for much equipment used in hard installations. If isolators are required they should be designed as low frequency systems that impose one g acceleration on the isolated equipment. Increase of the acceleration to be tolerated by the equipment will, in the great majority of instances, reduce neither the rattle space required nor the isolator cost. Methods for making the necessary computations are given. (Author)

AD-458 460 **Field 13M, 13J**
CFSTI Price: HC$4.00
Naval Civil-Engineering Lab., Port Hueneme, Calif.
A HYDRAULIC-PNEUMATIC FLOATING FENDER.
Final technical rept., Mar 63-May 64.
by T. T. Lee. 19 Feb 65, 43p R-334
Proj. Y-F015-10-03-303
See also AD-613 940, AD-630 637.

Descriptors: (*Piers, Naval shore establishments), (*Marine safety equipment, Piers), Vibration isolators, Floats, Hydraulic systems, Pneumatic devices, Ships, Damage, Costs.

Identifiers: Fenders (Marine equipment), Camel fenders.

Service tests of two 50-foot-long floating fenders (each a bulkhead fronted by two water-filled and two air-filled rubber bags) show that they reduce damage to piers, pier-fender systems, and ships, particularly in protected harbors with only moderate swell and wind. They are higher in initial cost than fenders designed for similar work ($77 per lineal foot of wharf in 1963), but for long-range operation may prove more economical, based on one severe berthing in 10 years. Loading forces

and energy were calculated during a 14-month period from berthings of about 30 naval and merchant ships in Port Hueneme Harbor, California. Maintenance cost of the fenders was high. Modifications of this system are suggested, including shock absorbers called HYNEU, which employ an air-filled bag within a water-filled bag. Information is included which will aid engineers and designers in providing fenders that will absorb more energy than current systems. (Author)

AD-471 333 **Field 13M, 22B**
CFSTI Prices: HC$4.00 MF$1.00
Geophysics Corp. of America, Minneapolis, Minn. Viron Div.
AEROSPACE EXPANDABLE STRUCTURES AND MAINTENANCE SUPPORT DEVICES. VOLUME I. EXPANDABLE SELF-RIGIDIZING SOLAR ENERGY CONCENTRATORS AND AEROSPACE SHELTERS FROM HONEYCOMB TYPE FABRIC.
Technical rept., 9 Dec 63-2 Nov 64.
by Ronald Rochon, Robert C. Clark, Nels S. Hanssen, and William J. McKillip. Jul 65, 167p
Contract AF 33 (615)-1243
Projs. AF-8170, 3145
Tasks 817004, 314502
AFAPL-TR-65-40-Vol-I
Subcontracted to Archer-Daniels Midland Co., Minneapolis, Minn.

Descriptors: (*Space maintenance, Extendable structures), (*Extendable structures, Space maintenance), (*Inflatable structures, Honeycomb cores), Shelters, Solar radiation, Solar collectors, Textiles, Plastics.

Materials and techniques were improved to advance the concept of expandable, self-rigidizing honeycomb type structures. The strength to weight ratio of structures was markedly improved through the correct utilization of inflatable configurations with a high degree of structural rigidity. A rigidizing resin was developed with an improved strength/weight ratio, a more rapid cure time, and a good shelf life. Solar collectors with reasonably good optical reflectivity and aerospace shelters were fabricated, expanded, and rigidized. Two large sized structures suitable for space application were constructed as end items of this study. Those structures were a 10 foot diameter, 60 degree rim angle solar energy concentrator and a 13 x 15 ft semi-cylindrical aerospace maintenance dock. Both structures, utilized a resin impregnated honeycomb type fabric construction and were inflated and rigidized from a packaged configuration. The maintenance dock was successfully designed for 30 psf gravity and 100 mph wind loads. Both structures significantly advanced the concept of expandable, self-rigidizing structures by their size, construction, and performance. (Author)

AD-474 719 **Field 13M, 20K, 20A, 13J**
CFSTI Prices: HC$6.00 MF$1.00
Pennsylvania Military Coll., Chester.
ANALYTICAL INVESTIGATION OF THE DAMPING CAPABILITY OF LAMINATED BEAMS.
Research and development rept. Jul 64-30 Jun 65.
by R. A. DiTaranto. 18 Jun 65, 144p
Contract N161-25972
Proj. 67-103
MEL-235/65

Descriptors: (*Beams (Structural), Damping), (*Ship noise, Damping), Laminates, Vibration, Vibration isolators, Viscoelasticity, Boundary value problems, Sandwich construction, Mathematical analysis.

The free and forced vibration of a three-layer, elastic-visocoelastic-elastic, beam are investigated. The results of previous studies are extended to obtain the boundary-condition equation for free and forced vibrations. These are written explicitly. Detailed results are obtained for the sandwich beam having a thin viscoelastic layer. Generalized results are obtained for the composite loss-factor and are plotted for use by a design engineer. Curves are available which simplify the determination of the natural frequencies and the associated mode shapes, and which aid in the calculation of the forced response. (Author)

AD-477 706 **Field 13M, 13B, 13L**
CFSTI Prices: HC$6.60 MF$0.75
Cold Regions Research and Engineering Lab., Hanover, N. H.
CAMP CENTURY EVOLUTION OF CONCEPT AND HISTORY OF DESIGN CONSTRUCTION AND PERFORMANCE.
by Elmer F. Clark. Oct 65, 68p Technical rept.
TR-174
Proj. 1V025001A130

Descriptors: (*Military facilities, *Greenland), (*Civil engineering, Greenland), Buildings, Construction, Materials, Snow, Underground structures, Ice islands, Performance (Engineering).

This report tells the story of Camp Century, an effort to learn how to construct military facilities on the Greenland Ice Cap. It describes briefly the research done by a number of laboratories, scientists, and engineers in achieving this objective. It discusses the development of concepts, methods, and engineering techniques which made the construction of Camp Century possible. Engineering performance of the camp and its facilities is summarized, and some of the more important reports resulting from the effort are referenced. It is concluded in the report that subsurface ice-cap camps are feasible and practicable, that nuclear power offers significant advantages in reducing the logistical burden of supporting isolated, remote military facilities, and that the wealth of data and experience obtained from the Camp Century project will be of inestimable value in the development of designs for future ice-cap camps. (Author)

AD-635 691 **Field 13M, 20K**
CFSTI Prices: HC$2.00 MF$0.50
Brown Univ., Providence, R. I. Div. of Engineering.
THE BEHAVIOR OF A RIGID-PLASTIC COLUMN SUBJECTED TO A TRANSVERSE DYNAMIC DISTURBANCE.
by L. S. S. Lee, and J. B. Martin. Apr 66, 34p BU/DTMB/8
Contracts N189 (181)57827A (x), N189 (181)59217A (x)

Descriptors: (*Beams (Structural), *Deformation), Loading (Mechanics), Plasticity, Dynamics, Continuum mechanics.

The deformation of a pinned end axially loaded rigid-plastic beam-column subjected to a particular type of transverse motion is studied. Attention is directed primarily to determining whether or not the transverse displacements are unbounded. (Author)

AD-635 738 **Field 13M**
CFSTI Prices: HC$1.00 MF$0.50
Cold Regions Research and Engineering Lab., Hanover, N. H.
A STUDY OF A NEW FOUNDATION MODEL.
Research rept.
by Arnold D. Kerr. Mar 66, 17p RR-186
Proj. DA-1V025001A13001

Descriptors: (*Foundations (Structures), Models (Simulations)), Springs, Shear stresses, Load distribution, Mathematical analysis.

The characteristics of a new foundation model, consisting of two spring layers interconnected by a shear layer, are studied. The study is conducted on the classical problem of a foundation subjected to a rigid stamp. In order to reduce the number of foundation constants to an absolutely necessary minimum, special attention is given to a possible dependence of the constants of the upper and lower spring layers, particularly to the spring constant ratio three which is suggested by Reissner's foundation model. A comparison of the obtained pressure distributions with relevant experimental data seems to support the adoption of this value, thus reducing the number of foundation constants to two. Advantages of the presented model over other foundation models are pointed out. (Author)

AD-635 930 **Field 13M, 5C, 5A, 15C**
CFSTI Prices: HC$3.00 MF$0.75
Stanford Research Inst., Menlo Park, Calif.
ALTERNATIVE APPROACHES TO FINANCING A NATION-WIDE SHELTER PROGRAM: A CONTRIBUTING INVESTIGATION TO THE AREA-WIDE SHELTER SYSTEMS STUDY.
Final rept.
by Ernest C. Harvey. Jan 64, 100p
Contract OCD-OS-63-149
Proj. SRI-MU-4536
Updated April 1966 SRI-4536.

Descriptors: (*Fallout shelters, Federal budgets), Civil defense systems, United States, Costs, Economics, Management planning.

The report is the result of a preliminary attempt to examine alternative approaches to the problem of financing a nationwide shelter system and to assess their potential contributions and the problems associated with their utilization. Current practices applicable to capital investments by individuals and other segments of the private sector are discussed, some of the problems with respect to their utilization for shelter construction are listed, and incentive programs which could encourage action in this area are analyzed. In addition, local sources of funds and state and federal aid programs are discussed as a basis for evaluating the extent to which each of these levels of government could participate. With respect to federal and state programs, particular attention is given to the possibility of combining civil defense considerations with existing program objectives and to the identification of techniques that might be applicable to a separate national program designed to develop shelter capability.

AD-635 931 **Field 13M, 5A**
CFSTI Prices: HC$7.00 MF$1.75
Stanford Research Inst., Menlo Park, Calif.
AREA-WIDE SHELTER SYSTEMS.
Final rept.
by Richard I. Condit. Dec 65, 354p
Contract OCD-OS-63-149
Proj. SRI-MU-4536
SRI-4536 Original contains color plates. Reproduction will be in black and white.

Descriptors: (*Fallout shelters, Management planning), Civil defense systems, Site selection, Costs, California, Buildings, Population, Urban areas.

The report describes how a community may build up passive protection against the direct effects and/or the radioactive fallout from nuclear explosions. General concepts are presented, and specific applications are made to the City of San Jose, Calif., (pop. about 300,000). The extent of the passive protection employed is correlated with a reduction in the effective size of enemy weapons. The means for obtaining various degrees of passive protection for entire communities are indicated, and cataloged for San Jose. Included are the protection of (1) existing structures and facilities, (2) additions to and upgrading of shelters, (3) increased emergency-readiness measures, and (4) new shelter construction. And the indispensable support systems for shelter--training, warning, communications, radiological monitoring, emergency direction and control--are related to the array of protective facilities. Large incombustible open areas within the community are shown to be uniquely favorable sites for new facilities--either expedient or permanent--to be protective against the direct effects of blast and fire. The public school grounds and parks in San Jose are shown to be suitable in size and location for the prompt protection of the population there. When protecting against direct effects, downtown San Jose is

shown to be more hazardous than the remainder. Eight area-wide shelter systems are finally developed and evaluated for San Jose: Four for protection from direct effects and fallout; four for protection against fallout only. Characteristic curves of ultimate performance are presented for each system. (Author)

AD-636 048 **Field 13M**
CFSTI Prices: HC$7.00 MF$1.75
IIT Research Inst., Chicago, Ill. Technology Center.
ENTRANCEWAYS AND EXITS FOR BLAST-RESISTANT FULLY-BURIED PERSONNEL SHELTERS.
Research rept. (Summary).
by J. D. Stevenson, and J. A. Havers. Sep 65, 372p M6064 (3)
Contract OCD-PS-64-50
Proj. M6064
See also AD-458 314.

Descriptors: (*Fallout shelters, Design), Shelters, Underground structures, Configuration, Structural properties, Costs, Personnel, Steel, Reinforcing materials, Concrete, Shielding, Reinforced concrete, Shelter doors, Blast, Spheres, Stiffened cylinders, Structural shells, Loading (Mechanics), Traffic.

The report describes blast analyses, radiation analyses, traffic studies, and structural evaluations of entranceway and exit systems for fully-buried personnel shelters. Attention is directed to shelters of 100, 500 and 1000-man capacities.

AD-636 088 **Field 13M, 13J, 20K**
CFSTI Prices: HC$1.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
SUMMARY OF RESEARCH ON REINFORCED AND UNREINFORCED CYLINDRICAL SHELLS, 1961-1965.
Final rept.
by Joseph Kempner. Jun 65, 20p PIBAL-905
Contract Nonr-839 (14)
Proj. NR-064-167
See also AD-282 792.

Descriptors: (*Structural shells, Cylindrical bodies), (*Stresses, Structural shells), (*Submarine hulls, Stresses), Reinforcing materials, Deformation, Stability, Loading (Mechanics), Rings, Deflection, Buckling (Mechanics), Abstracts.

The studies briefly summarized in this report stem from the investigation of the transverse strength of submarines performed during the past four years. The work was primarily concerned with static stress and stability analyses of reinforced and unreinforced cylindrical shells. Within this framework linear and nonlinear stress and stability analyses were carried out. The summary presents brief abstracts of the material presented in twenty-two distinct reports and publications.

AD-636 284 **Field 13M**
CFSTI Prices: HC$2.60 MF$0.50
Nebraska Univ., Lincoln.
STUDY TO DETERMINE THE OPTIMUM SECTION OF REINFORCED CONCRETE BEAMS SUBJECTED TO BLAST LOADS.
Final rept.
by G. R. Swihart. Feb 59, 39p
Contract NBy-3146

Descriptors: (*Beams (Structural), *Blast), (*Reinforced concrete, Beams (Structural)), Design, Graphics, Deflection, Programming (Computers), Loading (Mechanics).

This study was performed to determine the combination of parameters which will provide the optimum resistance for reinforced concrete beams subjected to blast loading. The ultimate goal of the study was to enable selection of beams from design charts. Calculations were performed on an electronic digital computer making it possible to include a wide range of variables. The results are summarized in twelve design charts. Recommendations are offered for extending and improving the program. A numerical example illustrating the use of the charts is included in an appendix. (Author)

N66-14630 **Field 13M**
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
STRESS MEASUREMENTS ON BLAIR HIGH SCHOOL GYMNASIUM - A DEMONSTRATION OF SPACE TECHNOLOGY TRANSFER.
by D. Kastel. 1 Nov 65, 18p JPL-TR-32-837
Contract NAS7-100
NASA-CR-68996

Descriptors: *Data acquisition, *Computer method, *Scanning, *Strain gauge, *Stress measurement.

For abstract, see T 66 17.

N66-18069 **Field 13M**
CFSTI Prices: HC$2.00 MF$0.50
Hayes International Corp., Birmingham, Ala.
ENERGY ABSORBERS.
by J. V. Hodgins. 21 Jan 66, 38p Rept. no. 1228
Contract NAS8-11805
NASA-CR-70533

Descriptors: *Friction coefficient, *Shock absorber, *Stress analysis, *Expandable structure.

PB-169 933 **Field 13M, 13B, 12B**
CFSTI Prices: HC$3.00 MF$0.50
National Swedish Inst. for Building Research, Stockholm.
STUDIES OF THE BUILDING AND COMMUNITY PLANNING PROCESS.
by Nils E. Ryman. Oct 64, 39p Rept. no. 27:1965
Prepared for presentation at Conference on Operations Research in the Building Field in London Oct 1964.

Descriptors: (*Urban planning, Sweden), (*Civil engineering, Urban planning), Operations research, Construction, Housing projects, Buildings, Symposia.

Studies so far have primarily consisted of the documentation of projects already carried out. One of these comprises thirty typical production cases and answers questions on time consumed and the organization of the work between planning and moving-in. The other comprises only four development areas, in which the planning process has been studied more thoroughly. A theory for the breakdown into stages was formulated and collected data were used as a basis for process network planning. The report indicates how this network planning can be applied to the direction and control of the production process. Work so far has therefore been related in some senses to operations research, for example in the formulation of the problem, the design of a model and the collection of data. The model requires refinement, however and more data must be collected before an optimum process can be evolved.

PB-170 430 **Field 13M, 11G, 13B**
CFSTI Prices: HC$4.00 MF$0.75
Ohio State Univ., Columbus. Dept. of Civil Engineering.
EFFECT OF THE VISCOSITY OF ASPHALT ON THE RHEOLOGICAL PROPERTIES OF BITUMINOUS MIXTURES.
Final rept.
by Charles A. Pagen. May 65, 91p EES-191-4, 0303
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. and Ohio State Dept. of Highways.

Descriptors: (*Asphalt, Rheology), (*Viscosity, Asphalt), Viscosity, Temperature, Loading (Mechanics), Creep, Equations of state, Mechanical properties, Performance (Engineering), Mixtures, Roads.

To analyze the effects of asphalt viscosity or temperature on the mechanical properties of bituminous concrete, constant load compressive tests were employed. Using a standard creep testing program, the instantaneous elastic, retarded elastic, and viscous deformation were recorded and analyzed. Correlations were developed between original and recovered binder viscosity, mixture rheological strength moduli, and mixture deformations for a wide range of loading times and temperatures. The applications of linear viscoelastic theory, apparent activation energy concepts, and time-temperature superposition principle were investigated and validated. Equations of state relating stress, strain, time, and temperature-dependent behavior were developed and evaluated. These can be used to evaluate mechanical properties which cannot be obtained experimentally and to reduce the number of experiments needed to define the response of bituminous mixtures. (Author)

PB-170 432 **Field 13M, 13B**
CFSTI Prices: HC$6.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
SELECTIVE LITERATURE SURVEY - RESPONSE OF PAVEMENT SUBGRADES.
by R. P. Lavoie. Sep 65, 16p Research rept. no. R65-5270317
Contract DSR-9326
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. and Massachusetts Dept. of Public Works.

Descriptors: (*Foundations (Structures), Pavements), (*Soil mechanics, Sand), Reviews, Theory, Stresses, Deformation, Loading (Mechanics), Roads, Civil engineering.

This survey is concerned with literature discussing the stress-strain relations of idealized homogeneous cohesionless particlate systems (sand) which would be useful to predict the response of pavement subgrades. The interest in the survey is focused upon determining what factors affect the stress-strain relations and how, but not necessarily why, they affect. Three stress-strain theories for granular materials are reviewed: the Rowe theory, the Texas Transportation Institute theory, and the Shellhammer theory. The bibliography contains 47 references pertaining to theoretical derivations, laboratory studies and field studies. (Author)

PB-170 506 **Field 13M, 13B**
CFSTI Prices: HC$4.00 MF$1.50
California State Div. of Highways.
STRUCTURAL BEHAVIOR OF A BOX GIRDER BRIDGE (APPENDICES).
by Raymond E. Davis, John J. Kozak, and Charles F. Scheffey. May 65, 276p Rept. no. 0463, App.
Prepared in cooperation with Bureau of Public Roads, Washington, D. C., and California Univ., Berkeley. See also PB-170 498.

Descriptors: (*Box beams, Bridges), (*Bridges, Box beams), Civil engineering, Concrete, Beams (Structural), Structural properties, Experimental data.

Contents: Control test beams: Determination of concrete modulus; Description of LVDT studies of vertical strain distribution; Discussion of cracking phenomena-comparison of slab strains and curvature; Description of data reduction methods; Calculation of girder resisting moments; Comparison of static and dynamic strains; Compilations of strain data; Theoretical analysis - detailed procedure.

PB-170 508 **Field 13M, 13B**
CFSTI Price: HC$6.00 MF$0.50
Virginia Council of Highway Investigation and Research, Charlottesville, Va.

RESEARCH RELATING TO BRIDGE DECKS IN VIRGINIA.
by Marvin H. Hilton, Howard H. Newlon Jr, and Tilton E. Shelburne. Oct 65, 39p
Prepared for presentation to the Annual Meeting of the American Association of State Highway Officials, Bridge Committee Session, New York, 6 Oct 65.

Descriptors: (*Bridges, Pavements), (*Pavements, Bridges), Concrete, Civil engineering, Structures, Virginia.

The purposes of this paper are: (1) To present a brief summary of current or recently completed bridge research in Virginia, including a bibliography of reports and papers which treat each of the areas in depth, and (2) to discuss in more detail two of the projects which are most closely associated with the problems of bridge decks. The summary and bibliography are presented in an Appendix. The body of the paper is concerned with studies of surface roughness and characteristics of concrete as affected by screeding and finishing methods. (Author)

PB-170 519 **Field 13M, 13B**
CFSTI Prices: HC$6.00 MF$1.00
Virginia Univ., Charlottesville.
SUMMARY REPORT ON THERMAL STRESSES IN HIGHWAY BRIDGES.
by William Zuk. Oct 65, 139p SR-66-8, 0383
Prepared in cooperation with Bureau of Public Roads, Washington, D. C. and Virginia Council of Highway Investigation and Research.

Descriptors: (*Bridges, Thermal stresses), (*Thermal stresses, Bridges), Roads, Structures, Concrete, Steel, Composite materials, Civil engineering.

This report describes a four year program of research on the thermal effects of two different kinds of bridges; (1) composite, with steel stringers and concrete deck, and (2) monolithic reinforced concrete stringers and deck.

PB-170 637 **Field 13M, 13B**
CFSTI Prices: HC$6.00 MF$0.75
Bureau of Reclamation, Denver, Colo. Dams Branch.
STRUCTURAL BEHAVIOR ANALYSIS OF HUNGRY HORSE DAM FOR OCTOBER 1949 TO AUGUST 1961.
by Keith Jones, and Louis H. Roehm. Apr 66, 35p DD-2

Descriptors: (*Dams, Structural properties), (*Structural properties, Dams), Stresses, Montana, Deflection, Measurement, Civil engineering.

Strain meter clusters, stress meter pairs, 'no-stress' strain meter pairs, stressed strain meter pairs, and resistance thermometers were embedded in the concrete of Hungry Horse Dam during construction. At about the time of completion of the dam, three plumblines were suspended from approximately the crest to the dam foundation in wells formed in the concrete. Periodic readings of the embedded instruments were continued from installation through August 1961. Plumbline readings are to be continued indefinitely. Readings were reduced to stresses and deflections for use in structural behavior analysis of the dam. Maximum compressive stress of about 750 psi was measured. Tensile stresses of short duration occurred during early ages of the concrete. Deflections of the dam show a relationship to climatic temperature variations and reservoir water level. (Author)

AD-636 179 **See Field 9A**

AD-636 187 **See Field 20K**

PB-169 924 **See Field 4B**

PB-169 925 **See Field 4B**

PB-169 926 **See Field 4B**

PB-170 434 **See Field 13C**

PB-170 625 **See Field 11L**

PB-170 877 **See Field 13B**

14A. COST EFFECTIVENESS

AD-636 273 **Field 14A, 12B, 15E**
CFSTI Prices: HC$1.00 MF$0.50
Center for Naval Analyses, Washington, D. C.
COSTING FOR SYSTEMS ANALYSIS.
by N. V. Breckner, and J. W. Noah. 30 Mar 66, 23p
CNA Research Contrib-12
Contract Nonr-3732 (00)

Descriptors: (*Costs, Analysis), (*Systems engineering, *Cost effectiveness), Management planning, Military requirements.

Identifiers: Systems analysis.

Two principal dimensions of system cost analysis are addressed. First, the comparative analysis of alternative systems requires a method of structuring and synthesizing cost estimates in order to reveal both the total costs of achieving effectiveness and the significant differences to be found among various force-mixes. Second, the methods of estimating particular costs are evolving from a history of inappropriate or inaccessible data and great uncertainty concerning the time and cost of ultimately achieving demonstrated capability. Several important avenues for further work are discussed. (Author)

AD-636 140 **See Field 15E**

AD-636 147 **See Field 15E**

14B. LABORATORIES, TEST FACILITIES, AND TEST EQUIPMENT

AD-458 320 **Field 14B, 9C**
CFSTI Price: HC$4.00
Royal Aircraft Establishment, Farnborough (England).
A NEW STRAIN GAUGE BRIDGE FOR MEASURING ALTERNATING LOADS.
by N. J. Wadsworth, and B. F. Billing. Oct 64, 16p Technical rept. TR-64018

Descriptors: (*Strain gages, Electric bridges), (*Electric bridges, Strain gages), (*Measuring devices (Electrical + electronic), Design), Display systems, Control systems, Oscilloscopes, Great Britain.

A strain gauge bridge is described having two independent balancing controls and a display showing the output from both controls and zero output. A null balance may be obtained at both the tension and compression peaks of an alternating load waveform and both may be monitored continuously on the display. The setting of the balance controls is directly related to the change of resistance of the strain gauges and may be calibrated in terms of load. (Author)

AD-469 822 **Field 14B, 20I**
CFSTI Prices: HC$1.50 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
THE DEVELOPMENT AND USE OF A LANGMUIR PROBE.
Technical rept.
by P. G. Frayne, and T. G. Wills. Mar 65, 50p
TR-65046

Descriptors: (*Langmuir probes, Design), (*Plasma medium, Langmuir probes), Potassium, Ions, Glow discharges, Density, Great Britain.

The paper considers the practical design of a Langmuir probe finally intended for use in a thermally ionised potassium plasma. Preliminary results obtained in the positive column of a glow discharge in argon are described, with particular emphasis on the method of reduction of the experimental data. (Author)

AD-470 736 **Field 14B**
CFSTI Prices: HC$3.60 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
POSSIBLE MODIFICATIONS TO THE R.A.E. 7 in x 7 in INTERMITTENT HYPERSONIC TUNNEL.
by J. F. W. Crane, and D. H. Peckham. May 65, 38p Technical rept. TR-65103

Descriptors: (*Hypersonic wind tunnels, Performance (Engineering)), Reynolds number, Instrumentation, Vacuum apparatus, Test facilities, Configuration, Hypersonic flow, Velocity, Heating elements.

Consideration is given to the possibility of providing a larger working section for the hypersonic tunnel, and extending its Mach number range. Performance calculations are given which show that tests could usefully be made up to Mach numbers of about 12, and that the working section size could be increased to about 15 in x 15 in. It is concluded that the best way of incorporating the necessary modifications would be to add a second leg to the tunnel. (Author)

AD-474 312 **Field 14B, 21E**
CFSTI Prices: HC$3.00 MF$0.50
Aeroplane and Armament Experimental Establishment, Boscombe Down (England).
POSITIVE DISPLACEMENT LOW RATE FUEL FLOWMETER.
Technical rept.
by R. A. Standing. 3 Sep 65, 14p AAEE/Tech/295

Descriptors: (*Flowmeters, Fuel meters), (*Fuel meters, Aviation fuels), (*Aviation fuels, Fuel meters), Kerosene, Operation, Calibration, Flight testing, Great Britain.

This flowmeter is capable of measuring aviation fuels at rates between 30 and 3 gallons per hour to an accuracy of 1/2% for A.V.T.U.R. kerosene and within 25 for A.V.G.A.S. over a temperature range of -10 to +60C. (Author)

AD-635 753 **Field 14B**
CFSTI Prices: HC$2.00 MF$0.50
Naval Air Engineering Center, Philadelphia, Pa. Aeronautical Materials Lab.
DEVELOPMENT OF AN ENVIRONMENTAL WET TEST CHAMBER FOR SIMULATING CARRIER DECK AND OTHER CORROSIVE ENVIRONMENTS.
by E. J. Lion. 11 May 66, 42p NAEC-AML-2436
Task RRMA-03-013/200-1/F020-03-01

Descriptors: (*Test facilities, *Corrosion), Environmental tests, Reliability, Controlled atmospheres, Corrosive gases, Corrosive liquids.

An environmental wet test chamber was designed, developed and evaluated to simulate the wet environments of either coastal, industrial or shipboard sites. It provides an accelerated test procedure whereby results can be obtained in a matter of hours as compared to the days and weeks presently required in some commonly used environmental chambers. The unit permits the simultaneous testing of nine specimens and has proven its reliability in providing repeatable and reproducible patterns or corrosion. Specimens can be removed for examination or replacement without interrupting the operation of the unit, or disturbing the environ-

ment, or other specimens. The unit can be assembled from readily available, relatively inexpensive items, at a material cost not exceeding $100.00. (Author)

AD-635 895 Field 14B
CFSTI Prices: HC$6.60 MF$0.75
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
THE DEVELOPMENT OF THE STRAIN-GAGE BALANCE SYSTEM FOR THE SUPERSONIC WIND TUNNEL AT LONE STAR LABORATORY.
Doctoral thesis.
by Robert M. Mains. Jan 47, 67p Bumblebee-51
Contract NOrd-7386
Presented to the Graduate Faculty of Lehigh Univ., Oct. 1946.

Descriptors: (*Balances, *Supersonic wind tunnels), Strain gages, Elasticity, Force (Mechanics).

The general three-dimensional force problem can be solved by strain-gage measurements on an elastic system. In addition, the elastic system on which the measurements are made can be fitted into a supersonic wind tunnel of the size used at the Lone Star Laboratory. The points of measurement can be located very near to the model, in contrast with the usual wind-tunnel balances, and the use of an elastic measuring device eliminates the ordinary problems which arise from friction and deformation. (Author)

AD-635 897 Field 14B
CFSTI Prices: HC$2.00 MF$0.50
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
EFFECTS OF DIFFUSION PUMP OIL CONTAMINATION ON THE REFLECTANCE CHARACTERISTICS OF VARIOUS SURFACES.
Rept. for 1 Mar-1 Jun 65.
by E. C. Pinion. Jul 66, 41p AEDC-TR-66-53
Contract AF 40 (600)-1200
Proj. ARO-SW-3507
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Space simulation chambers, Surfaces), (*Reflection, Space simulation chambers), (*Oils, Contamination), Diffusion pumps, Backscattering, Films, Thickness, Thermal radiation.

During thermal testing in a space simulation chamber, the extent of diffusion pump oil contamination on all important surfaces should be determined. This information and an understanding of the reflectance characteristics of the oil contaminated surfaces would contribute to a more reliable interpretation of the thermal test data. Hence, an experimental study was made of the effects of diffusion pump oil contamination on the reflectance and radiation distribution of four types of surfaces found in space simulation chambers. The total reflectance and angular distribution measurements were made in the radiation wave-length range from 0.4 to 1.2 microns. The spectral reflectance measurements were made in the radiation wavelength range from 0.35 to 10 microns. These data were obtained as a function of oil film thickness, angle of incidence, wavelength, and substrate material. Contamination of surfaces caused by diffusion pump oil backstreaming alters the reflectance characteristics of the substrate-oil film combinations. (Author)

AD-635 899 Field 14B
CFSTI Prices: HC$2.00 MF$0.50
Naval Avionics Facility, Indianapolis, Ind.
A METHOD OF OPTIMIZING AVAILABLE CALIBRATION TIME IN A TEST EQUIPMENT RECALL SYSTEM.
Technical rept.
by Bruce R. Glenn. 1 May 66, 30p NAFI-TR-824

Descriptors: (*Calibration, Time studies), (*Optimization, Calibration), Test equipment, Manpower studies.

Identifiers: PROTECT.

This report presents a proposed method for recalling test equipments for scheduled calibration. This method minimizes the number of instruments in use that are out-of-tolerance when only a limited amount of manpower is available for calibration. (Author)

AD-636 101 Field 14B
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
MINIATURE RECORDING OPTICAL PYROMETER.
Technical memo.
by Maynard L. Hill, James M. Akridge, and Christian A. Keller. May 66, 19p TG-825
Contract NOw-62-0604-c

Descriptors: (*Photoelectric pyrometers, Photoelectric cells (Semiconductor)), Miniature electronic equipment, Optical equipment, High-temperature research, Recording systems, Temperature, Measurement, Hypersonic flow.

A miniature recording optical pyometer, based on a photovoltaic diode, has been developed for measuring temperatures in the range 2000 to 6000 F in hypersonic environments where thermocouples are inadequate. The devices have a rapid response and a raw signal that is a suitable input for standard strip recorders. (Author)

AD-636 154 Field 14B
CFSTI Prices: HC$1.00 MF$0.50
Army Engineer Geodesy Intelligence and Mapping Research and Development Agency, Fort Belvoir, Va.
INSTRUMENT FOR MEASURING ABSOLUTE ACCELERATION OF GRAVITY.
by Kenneth D. Robertson. Jun 66, 16p Research note-18
Proj. DA-4A013001A91D

Descriptors: (*Gravity, Measurement), Acceleration, Instrumentation, Interferometers, Lasers, Vacuum.

A method is presented for the determination of the absolute acceleration of gravity. A reflector, terminating one arm of an interferometer is allowed to drop in a vacuum chamber. The fringes generated as the reflector falls, together with precise timing equipment, may permit measurements to be made with an accuracy of one part in 10 to the 7th power. Design criteria for the instrument are presented. (Author)

AD-636 162 Field 14B, 20L, 7D
CFSTI Prices: HC$1.00 MF$0.50
Systems Research Labs., Inc., Dayton, Ohio.
A PROGRAMMABLE LOW ENERGY ELECTRON DIFFRACTION DEVICE.
by A. G. Jackson, D. E. Floyd, and P. W. Bunce.
Apr 66, 20p
Contract AF 33 (615)-1047
Proj. AF-7023
ARL-66-0067
See also AD-630 863.

Descriptors: (*Electron diffraction analysis, Instrumentation), (*Semiconductors, Surface properties), Intensity, Electromechanical converters, Automatic, Programming (Computers), Electron guns.

Identifiers: LEED.

A LEED device of the Faraday cage type has been constructed which is capable of being programmed to collecgt intensity data at predetermined colatitude and azimuth angles. The range of angles which can be programmed is 0 degrees to 360 degrees in azimuth and 0 degrees to 80 degrees in colatitude. By using a metal chamber, ruggedness and simplicity in construction is achieved. The device is flexible enough to allow for an increase in automation by using punch card type inputs and to allow for a simple modification to a display device. Use of rotary motion feedthroughs permits firm control over motion of the sample and collector. (Author)

AD-636 280 Field 14B, 17B
CFSTI Prices: HC$1.00 MF$0.50
Lincoln Lab., Mass. Inst. of Tech., Lexington.
LINCOLN EXPERIMENTAL TERMINAL.
Technical note.
by Paul Rosen, Ralph V. Wood Jr, and Burt E. Nichols. 11 May 66, 17p LL-TN-1966-30
Contract AF 19 (628)-5167
Proj. 649L
ESD-TR-66-206
See also AD-630 702.

Descriptors: (*Space communication systems, Laboratories), Test equipment (Electronics), Mobile, Radio equipment, Moon, Satellites (Artificial), Antennas, Antenna feeds, Multiplex operation, Digital recording systems, Voice communication systems.

Identifiers: LET, Vocoders.

The Lincoln Experimental Terminal (LET) is a complete, self-contained air-transportable ground terminal for testing and demonstrating evolving space communication techniques in a realistic environment. Its present equipment complement permits efficient, highly reliable, multiplexed digital communication of voice and record traffic using a variety of channels, including the moon and active satellites. Its modulation system, using a 16-symbol alphabet frequency-hopped over a 20-Mcps band, together with efficient coding, provides multiple-access use of a wide-band satellite. (Author)

N66-12173 Field 14B
CFSTI Prices: HC$6.00 MF$1.25
Radio Corp. of America, Burlington, Mass. Aerospace Systems Div.
FLIGHT DATA DISPLAY STUDIES FOR REAL TIME COMPUTER FLIGHT EVALUATION.
Final rept.
by J. C. Flint, C. F. Matthews, and J. W. Tuttle.
25 Sep 65, 204p CR-588-137
Contract NAS8-11276
NASA-CR-68281

Descriptors: *In-flight monitoring, *Real time, *Saturn launch vehicle, *Display system.

For abstract, see T 66 17.

N66-12348 Field 14B
CFSTI Prices: HC$5.00 MF$1.00
Lockheed-Georgia Co., Marietta. Nuclear Labs.
MODIFICATION AND MAJOR OVERHAUL OF CRYOGENIC IRRADIATION FACILITY AT PLUMBROOK REACTOR FACILITY.
1965, 165p ER-8207
Contract NAS3-6210
NASA-CR-54770

Descriptors: *Cryogenic equipment, *Irradiation, *Plum brook reactor.

N66-15011 Field 14B
CFSTI Prices: HC$2.00 MF$0.50
Atomic Energy of Canada, Ltd., Chalk River (Ontario).
LARGE-VOLLUME COAXIAL GERMANIUM GAMMA-RAY SPECTROMETERS.
by I. L. Fowler, and H. L. Malm. Oct 65, 36p
AECL-2504
Prepared for presentation at IEEE Nuclear Scientific Symposium (12th) San Francisco, Calif., 18-20 Oct 65.

Descriptors: *Germanium, *P-I-N diode, *Spectrometer, *Gamma ray beam.

N66-15391 **Field 14B**
CFSTI Prices: HC$2.00 MF$0.50
Coordinated Science Lab. Illinois Univ., Urbana.
PHOTO CURRENT SUPPRESSOR GAUGE DEVELOPMENT.
Final rept.
by W. L. Schuemann. Mar 65, 27p R-249
Contract DA-28-043AMC-00073 (E), Grant NsG-376
NASA-CR-69342

Descriptors: *Electronic equipment, *Ionization gauge, *Photoelectricity, Suppressor.

N66-15393 **Field 14B**
CFSTI Prices: HC$1.00 MF$0.50
Midwest Research Inst., Kansas City, Mo.
EXTREME VACUUM TECHNOLOGY INCLUDING CRYOSORPTION, DIFFUSION PUMP AND PRESSURE CALIBRATION STUDIES.
Quarterly status rept. no. 8, 1 May-1 Aug 65.
by P. J. Bryant, and C. M. Gosselin. 27 Aug 65, 25p
Contract NASr-63 (06)
NASA-CR-69333

Descriptors: *Magnetron, *Cold cathode, *Penning gauge.

N66-15410 **Field 14B**
CFSTI Prices: HC$1.00 MF$0.50
Hughes Research Labs., Malibu, Calif.
RESEARCH ON GRAVITATIONAL MASS SENSORS, RESEARCH CONTRACT STATUS REPORT, 15 Sep-15 Oct 65.
by R. L. Forward. 25 Oct 65, 6p
Contract NASw-1035
NASA-CR-69361

Descriptors: *Barium titanate, *Gravity, *Piezoresistive device, *Torsional stress.

N66-15674 **Field 14B**
CFSTI Prices: HC$2.00 MF$0.50
Weapons Research Establishment, Salisbury (Australia).
INSTRUMENTATION TRIAL DE5/5 - ANALYSIS OF INSTRUMENT PERFORMANCE.
by W. W. Barnes. Oct 65, 29p WRE-SAD-40

Descriptors: *Cinetheodolite, *Instrumentation, *Radar, *Tracking radar, *Ballistic camera, *Error.

N66-15819 **Field 14B**
CFSTI Prices: HC$1.00 MF$0.50
TRW Systems, Redondo Beach, Calif. Physical Electronics Lab.
VELOCITY SELECTOR FOR AN ELECTROSTATIC HYPERVELOCITY ACCELERATOR.
by D. O. Hansen. Jul 65, 10p STL-4158-6008-TU-000
Contract NAS-936
NASA-CR-69574

Descriptors: *Electrostatic generator, *Velocity measurement, *Particle detector.

N66-15981 **Field 14B**
CFSTI Prices: HC$2.00 MF$0.50
Illinois Univ., Urbana. Coordinated Science Lab.
THEORETICAL AND EXPERIMENTAL STUDIES OF THE UNDERLYING PROCESSES AND TECHNIQUES OF LOW PRESSURE MEASUREMENT.
Semiannual status rept. 1 Sep 64 - 28 Feb, 65.
by F. M. Propst. Jul 65, 48p
Grant NsG-376
NASA-CR-69654

Descriptors: *Adsorption, *Angular distribution, *Electron emission, *Mass spectrometer, *Secondary emission, *Crossed field, *Ion pump.

N66-15997 **Field 14B**
CFSTI Prices: HC$2.00 MF$0.50
Radio Propagation Unit, National Physical Lab., New Delhi (India).
A SOLAR RADIOMETER AT 2000 MC/S.
Scientific rept.
by M. N. Joshi, and N. V. G. Sarma. 15 Jun 65, 29p RPU-S-21, Scientific-21

Descriptors: *Solar flux, *Microwave radiometer, *Radio wave, *Ultrahigh frequency.

N66-16160 **Field 14B**
CFSTI Prices: HC$5.00 MF$1.25
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
SOLAR SIMULATION RESEARCH.
by C. H. Duncan, J. Flemming, D. Gallagher, W. Gdula, and D. Lester. Aug 65, 185p NASA-TM-X-55364, X-633-65-332
Contract NAS5-2382

Descriptors: *Solar simulator, *Arc chamber, *Radiometry.

N66-17902 **Field 14B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
F M TELEMETRY AND FREE-FLIGHT TECHNIQUES FOR AERODYNAMIC MEASUREMENTS IN CONVENTIONAL WIND TUNNELS.
by G. W. Coon, D. R. Harrison, R. J. Hruby, J. H. Kemp Jr, and J. B. McDevitt. Mar 66, 25p
NASA-TN-D-3319

Descriptors: *Free flight test apparatus, *Surface pressure, *Telemetry, *Wind tunnel.

N66-18437 **Field 14B**
CFSTI Prices: HC$3.00 MF$0.50
Consolidated Controls Corp., Bethel, Conn.
PRESSURE MEASURING SYSTEMS FOR CLOSED CYCLE LIQUID METAL FACILITIES.
Quarterly rept. no. 7, 1 Sep-30 Nov 65.
by A. J. Cassano. 25 Jan 66, 70p CCC-534
Contract NAS3-4170
NASA-CR-54899

Descriptors: *Closed cycle, *liquid metal, *Pressure transducer, *Thermionic diode.

N66-18441 **Field 14B**
CFSTI Prices: HC$1.00 MF$0.50
Yale Univ., New Haven, Conn. School of Medicine.
CONDUCT RESEARCH ON GAS CHROMATOGRAPHIC SYSTEMS TO ANALYZE CERTAIN CHEMICAL CONSTITUENTS OF THE SURFACE OF THE MOON.
Progress rept. 1 Jul - 31 Dec 65.
by S. R. Lipsky. 25 Feb 66, 4p
Grant NsG-192
NASA-CR-70849

Descriptors: *Lunar surface, *Mass spectrometer, *Gas chromatography, *Instrumentation.

PB-170 445 **Field 14B, 13B, 20K**
CFSTI Prices: HC$6.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
DEFLECTION CURVE FOR AN INFINITE PLATE ON A NONLINEAR ELASTIC (WINKLER) BASE.
by James E. Ashton. Aug 65, 58p Research rept. no. R65-35, 0295
Prepared in cooperation with Massachusetts Dept. of Public Works, Boston, and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Roads, Deflection), (*Flat plate models, Deflection), (*Deflection, Roads), Foundations (Structures), Elasticity, Programming (Computers), Nonlinear systems, Soil mechanics, Modulus of elasticity.

A solution technique is developed and presented for the investigation of the deflection curve of an infinite plate or slab on a non-linear elastic (Winkler) base. Such a system is analogous to that of a pavement on a normal subgrade. The analysis has traditionally been made assuming that the subgrade reaction is linear, and the purpose of the investigation was to check the validity of such an assumption. The technique used utilizes a gridwork analogy for the plate, and it has been programmed for an IBM 7040 digital computer. The problem is solved by making a perturbation about the linear solution and iterating. A typical foundation load-deflection curve is used, and the results presented in figures in the appendix. An equation relating the error involved in using the linear assumption to the basic plate parameters and load is presented. The conclusion reached is that the linear assumption gives accurate results within the range of deflections normally encountered in pavements, under the typical conditions investigated. (Author)

PB-170 612 **Field 14B, 9C**
CFSTI Prices: HC$4.00 MF$0.50
Bureau of Naval Weapons Representative, Pomona, Calif. Metrology Engineering Center.
DIRECT CURRENT INDICATING INSTRUMENTS.
Technical manual; instrument calibration procedure, A1-01.
15 Apr 66, 10p
NAVWEPS-17-20A1-01
PB-171 210, superseded.

Descriptors: (*Test equipment, Calibration), (*Ammeters, Calibration), Direct current, Test methods, Instruction manuals.

PB-170 727 **Field 14B**
CFSTI Price: HC$4.00
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DIGITAL-COMPUTER CALCULATION OF TRANSDUCER FREQUENCY RESPONSE FROM ITS RESPONSE TO A STEP FUNCTION.
Progress rept.
by Ralph B. Bowersox, and Joseph Carlson. 26 Jul 57, 16p JPL-PR-20-331
Contract DA-04-495-ORD-18
AD-153 462

Descriptors: (*Transducers, Frequency), Time, Integral transforms, Digital computers, Pressure, Phase shift, Errors, Test methods, Pressure gages, Numerical analysis.

The frequency response of a transducer may be computed by observing its output as a function of time when a known input function is used. The ratio of the Fourier transform of the output function to the Fourier transform of the input function is the desired frequency-response function. The Fourier transform involved has been computed by means of a digital computer. The accuracy of this method has been checked by using several different known output functions and, also, by assuming various types of error in the initial data. (Author)

AD-465 088 **See Field 5H**

AD-469 187 **See Field 20K**

AD-472 792 **See Field 8C**

AD-476 292 **See Field 13H**

AD-480 715 **See Field 6M**

AD-480 716 **See Field 6M**

AD-635 594 **See Field 20K**

AD-635 604 See Field 4A

AD-635 780 See Field 8J

AD-635 807 See Field 9A

AD-635 808 See Field 20K

AD-635 856 See Field 11F

AD-636 035 See Field 20F

AD-636 095 See Field 20C

AD-636 148 See Field 19A

AD-636 149 See Field 20L

AD-636 160 See Field 20I

AD-636 265 See Field 15F

PB-169 953 See Field 1E

PB-170 411 See Field 20G

PB-170 428 See Field 13B

PB-170 596 See Field 9C

PB-170 598 See Field 9C

PB-170 632 See Field 9C

PB-170 742 See Field 13B

PB-170 748 See Field 9C

PB-170 753 See Field 9C

14C. RECORDING DEVICES

AD-449 917 Field 14C
CFSTI Price: HC$1.50
Royal Aircraft Establishment, Farnborough (England).
AN AIRBORNE DIGITAL MEASUREMENT AND RECORDING SYSTEM WITH DIRECT REPLAY TO A DIGITAL COMPUTER.
by B. E. Grant, R. L. Jefferies, and M. Rabnott.
Mar 64, 25p Technical note TN-WE-55

Descriptors: (*Digital recording systems, Magnetic recording systems), (*Magnetic recording systems, Digital recording systems), Multiplex, Digital computers, Airborne, Great Britain, Transducers, Magnetic tape, Programming (Computers), Calibration, Measuring devices (Electrical + electronic), Mechanical drawings, Analog-to-digital converters.

A self contained system for airborne use is described, which multiplexes information from a number of transducers, converts the signals to digital form, and records with 10-bit resolution on magnetic tape, suitable for immediate replay into the Mercury computer. The computer is programmed to demultiplex the data (with self checking and calibrating routines) and rescale from original transducer calibration curves. Hence the original measurements from each channel are presented in true dimensions against a linear timescale. A description of the computer programme is included. (Author)

N66-18442 Field 14C
CFSTI Prices: HC$3.00 MF$0.75
Kinelogic Corp., Pasadena, Calif.
TAPE GUIDANCE STUDY.
Final rept.
by I. Karsh, and R. Shatavsky. Jan 66, 84p
Contract NASA7-100
NASA-CR-70837

Descriptors: *Guidance system, *Amplitude modulation, *Magnetic tape.

PB-170 389 See Field 1C

14D. RELIABILITY

AD-635 607 Field 14D, 9A
CFSTI Prices: HC$2.00 MF$0.50
Navy Electronics Lab., San Diego, Calif.
THERMAL (INFRARED) RADIOMETERS AS INSTRUMENTS FOR NONDESTRUCTIVE RELIABILITY TESTING.
Research rept. Oct 65-Mar 66.
by R. M. Fraser. 10 May 66, 29p NEL-1377
Proj. SF-013-14-04
Task 5786 (NEL r11061)

Descriptors: (*Radiometers, Infrared equipment), (*Non-destructive testing, Radiometers), (*Integrated circuits, Reliability (Electronics)), Thermal radiation, Graphics, Analysis.

Exploitation of radiometers for the reliability testing of monolithic integrated circuits requires a knowledge of the capabilities and limitations of these instruments. As a basis for the design, development, and evaluation of radiometer systems, graphs have been worked out which illustrate the interaction of the major design parameters and the system requirements. The graphs were obtained by an analysis of the thermal detection and display problems from an engineering viewpoint. (Author)

AD-635 782 Field 14D, 4A
CFSTI Prices: HC$2.00 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE DEVELOPMENT OF A HIGH ACCELERATION TESTING TECHNIQUE FOR THE ELECTRONIC INSTRUMENTATION OF HARP PROJECTILE SYSTEMS.
Memorandum rept.
by Spence T. Marks, and James O. Pilcher II. Mar 66, 38p BRL-MR-1738
Proj. RDT/E-1VO14501B53C

Descriptors: (*Instrumentation, Reliability (Electronics)), (*Electronic equipment, Impact tests), Acceleration, Test methods, Upper atmosphere, Sabot projectiles, Deceleration, Test equipment.

Identifiers: HARP.

A brief description of Project HARP (High Altitude Research Project) is given, and the acceleration testing requirements for the electronic instrumentation of the projectiles are stated. The acceleration testing methods which have previously been employed are reviewed. A BRL project for the development of a satisfactory acceleration testing technique for this purpose is described, and test results are given. These test results are analyzed, and test criteria are established and evaluated. (Author)

AD-635 601 See Field 9E

AD-635 968 See Field 11F

AD-636 125 See Field 12B

AD-636 177 See Field 9A

AD-636 283 See Field 9A

PB-170 763 See Field 1B

14E. REPROGRAPHY

AD-635 855 Field 14E, 8B
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
A DEVICE FOR COMPENSATING THE LINEAR SHIFT OF AN IMAGE DURING OBLIQUE PHOTOGRAPHY WITH A SUCCESSIVE-FRAME AERIAL CAMERA.
by A. I. Sizov. 19 May 66, 6p FTD-HT-66-86
Unedited rough draft trans. of Patent (USSR) 165 374, appl. 873614/26-10, 30 Dec 63.

Descriptors: (*Aerial cameras, *Camera components + accessories), Aerial photography, Photographic images, Distortion, Camera shutters, Electric motors, USSR, Patents.

The object of the invention is a device for compensation of the linear shift of an image during oblique photography by a successive-frame aerial camera by means of sequential exposure of the zones of the frame, which are parallel to the principle horizontal plane of the photograph, containing a focal plane continuous action shutter, a two-wedge compensator and electric motor; and which is distinguished by the fact that for the purpose of fulfilling the required law of change of the rate of compensation along the field of the frame during uniform movement of all elements, the focal plane shutter is kinematically connected through the differential reducer with the electric motor of a two-wedge compensator. (Author)

AD-636 110 Field 14E, 20D
CFSTI Prices: HC$4.60 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
A WORKING MANUAL FOR SPARK SHADOWGRAPH PHOTOGRAPHY.
by Ben S. Melton, Rochelle Prescott, and Everett L. Gayhart. Dec 48, 48p Bumblebee-90
Contract NOrd-7386

Descriptors: (*Spark shadowgraph photography, Instruction manuals), (*Supersonic flow, Photographic techniques), Transonic flow, Density, Wind tunnels.

The manual explains in detail some specific procedures for making satisfactory spark shadowgraphs of density variation phenomena in an air stream moving at transonic or supersonic velocity. The information permits each such system to be designed as a tool, including the choice, size and placement of its components without the necessity of building preliminary equipment to establish the practicability of a given arrangement. Because this system is, at present, the only known method of making short exposure shadowgraphs of gas density phenomena under usual wind tunnel conditions, offering both photographic effectiveness and short duration as compared with other light sources, its choice for use in shadowgraph systems becomes almost mandatory. (Author)

N66-12197 Field 14E
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PLANETARY PHOTOGRAPHY-TELEVISION CAMERA FOR A GEOLOGICAL SURVEY OF THE PLANET MARS.
by L. R. Malling. 20 Jul 62, 13p JPL-TM-33-76
Contract NAS7-100
NASA-CR-68127

Descriptors: *Electronic photography, *Mars surface, *Photogeology, *Spacecraft television.

For abstract, see T 66 17.

N66-17546 Field 14E
CFSTI Prices: HC$1.00 MF$0.50
Norsk Radiumhospital, Oslo.
PHOTOGRAPHIC ISODOSE MEASUREMENTS IN INHOMOGENEOUS MATTER.
by O. Netteland. 1964, 10p CONF-640918-2
Contract AT (30-1)-2607
Presented at the Symp. of High Energy Electrons, Montreux, Switzerland, Sep. 1964.

Descriptors: *Electron photography, *High energy electron, *Radiation dose, *Photographic measurement.

AD-635 869 See Field 5I

AD-636 172 See Field 22B

AD-636 190 See Field 8B

PB-169 969 See Field 5B

15C. DEFENSE

AD-430 728 See Field 5K

AD-477 017 See Field 5A

AD-635 820 See Field 6R

AD-635 821 See Field 6R

AD-635 822 See Field 6R

AD-635 823 See Field 6R

AD-635 824 See Field 6R

AD-635 930 See Field 13M

AD-636 206 See Field 18D

15E. LOGISTICS

AD-636 039 Field 15E
CFSTI Prices: HC$13.60 MF$1.00
RAND Corp., Santa Monica, Calif.
BASE-DEPOT REQUISITIONING PIPELINE TIMES.
by Annette Heuston, R. M. Paulson, and A. H. Rosenthal. 1 Nov 60, 132p RM-2656
Contract AF 49 (638)-700

Descriptors: (*Supply depots, Logistics), (*Stock level control, *Logistics), Military requirements, Air Force, Inventory, Management engineering, Time.

The study examines Air Force base-depot requisitioning pipeline times by segment, for selected ZI and overseas bases. It covers requisitions made during a six-week sample period in 1959, and shows that 69 per cent of them did not meet standards of resupply performance. As a result, a greater stock of serviceable assets was in the resupply pipeline than was planned for. The quantity of stock necessary to support the resupply pipeline is one of the dominant uncertainties in the computation of requirements for all Air Force spare parts. Until recently, only average pipeline figures were available. The study was undertaken to provide more pipeline data, and in greater detail, than were currently available. The authors arranged to have pipeline data collected from four ZI bases, three overseas bases, and three overseas rotational squadrons, with the help of base personnel and the cooperation of the four commands under which the various bases were operating. Data were also collected from the two supporting depots, three LOG-COM (Logistics-Communications) relay stations, and the Tulsa Network Control Center. (Author)

AD-636 140 Field 15E, 14A
CFSTI Prices: HC$2.00 MF$0.50
Research Analysis Corp., McLean, Va.
A PROGRAMMING MODEL FOR DETERMINING THE LEAST-COST MIX OF AIR AND SEALIFT FORCES FOR RAPID DEPLOYMENT.
by George R. Fitzpartick, and Justin C. Whiton. Jul 66, 29p RAC-P-19
Prepared for presentation at NATO Advisory Panel on Operational Research Conference on "Analysis of Systems of Military Transportation", Oxford, England 25-29 Jul 66.

Descriptors: (*Linear programming, *Deployment), (*Cost effectiveness, Deployment), Model theory, Transportation, Military requirements.

For abstract, see T 66 17.

AD-636 147 Field 15E, 13J, 14A
CFSTI Prices: HC$2.00 MF$0.50
Navy Marine Engineering Lab., Annapolis, Md.
A PRELIMINARY STUDY OF THE DESIRABILITY OF A PART REPLACEMENT POLICY FOR NAVAL STEAM PROPULSION PLANTS: DEVELOPMENT OF A METHOD OF APPROACH.
Research and development rept.
by Bruce H. Morgan. Jul 66, 47p MEL-147/66
Proj. S-R011-01-01

Descriptors: (*Marine propulsion, Steam), (*Maintenance, Marine propulsion), Steam power plants, Reliability, Mathematical prediction, Maintainability, Cost effectiveness, Statistical analysis.

The report considers some of the concepts and mathematics of reliability engineering having potential application to the maintenance of a naval steam propulsion plant. In particular, it raises the question as to whether more scheduling of part renewals might be advantageous from the standpoint of long-term cost and effectiveness. It is planned to improve continually on the assumptions and mathematics used herein as more definitive operational data become available. (Author)

AD-636 171 Field 15E, 19E
CFSTI Prices: HC$5.60 MF$0.75
RAND Corp., Santa Monica, Calif.
SUPPLY AND DEPOT-REPAIR INTERACTIONS: A CASE STUDY OF ELECTRONICS SUPPORT.
by J. W. Petersen, R. M. Paulson, and W. A. Steger. 16 Apr 59, 60p RM-2365

Descriptors: (*Electronic equipment, *Maintenance), Fire control systems components, Logistics, Cost effectiveness.

This memorandum examines the relation between spares investment and the length of the depot repair-cycle. There is an economic tradeoff between supply-cost and depot repair-action, and it would pay to reduce the repair cycle as long as the supply-savings per unit-reduction remained greater than the cost of achieving the reduction. The procedure used to study the above tradeoff was to postulate a specific reduction in repair-cycle time, and balance the resultant supply-savings against the costs of achieving it. The study used a sample of 50 depot-reparable airborne fire-control spare items upon which to base the estimates of savings and costs. The results of the study demonstrate the importance of including the supply-cost implications of repair-cycle length as an explicit element in planning repair capability, and as a criterion of depot performance. Support costs are joint costs; to judge depot performance on the sole basis of repair cost is far too narrow. The goal should be to achieve that mix of supply and maintenance resources which will minimize the joint costs. This study indicates that the potential savings to be realized by a more explicit consideration of this proper mix are not trivial, especially since this holds for all depot-reparable items.

AD-469 621 See Field 5H

AD-636 273 See Field 14A

15F. NUCLEAR WARFARE

AD-636 265 Field 15F, 20M, 14B
CFSTI Prices: HC$2.60 MF$0.50
Quartermaster Research and Engineering Command, Natick, Mass.
A THERMAL PULSE SHAPER MECHANISM.
by Walter Zagieboylo, and Arthur Levine. 16 Nov 60, 26p T-31

Descriptors: (*Thermal radiation, Nuclear explosions), (*Nuclear explosions, Simulation), Electric arcs, Heat flux, Control systems, Nuclear weapons, Simulators.

A shaped pulse of intense thermal radiation, corresponding to the pulses from nuclear weapons, is obtained by the output of a QM carbon arc. A flywheel driven by a DC motor actuated a venetian blind shutter placed between a mirror and the target to control the flux. The combination produced reasonably good simulation and reproduction of the generalized field pulse.

PB-170 595 See Field 5C

15G. OPERATIONS, STRATEGY, AND TACTICS

AD-436 429 Field 15G, 5D
CFSTI Prices: HC$4.00
Special Operations Research Office, American Univ., Washington, D. C.
CASE STUDIES IN INSURGENCY AND REVOLUTIONARY WARFARE: VIETNAM 1941-1954.
by Bert Cooper, John Killigrew, and Norman LaCharite. Jan 64, 155p

Descriptors: (*Counterinsurgency, Vietnam), (*Vietnam, History), Political science, Communism, Government (Foreign), Foreign policy, Southeast Asia, France, Japan, Housing, Rural areas, Urban areas, Cereals, Population, Guerilla warfare, Communists, Military government, Military personnel, Military organizations.

Contents: Factors inducing revolution--economic maladjustment; social antagonism; political weakness; Dynamics of revolution--composition of revolutionary actors; revolutionary strategy and goals; ideology or myth; organization of the revolutionary movement; techniques of the revolution; and active involvement of foreign powers.

AD-635 876 Field 15G, 9B, 6D
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
MILLIONS OF OPERATIONS PER SECOND.
by N. Zubkov. 19 May 66, 11p FTD-HT-66-188 TT-66-61803
Unedited rough draft trans. of Voennye Znaniya p34-5 1965.

Descriptors: (*Operations research, *Cybernetics), (*Armed forces operations, Armed forces (Foreign)), Decision making, USSR.

For abstract, see T 66 17.

16B. MISSILE TRAJECTORIES

AD-635 589 See Field 4B

AD-635 590 See Field 4B

16C. MISSILE WARHEADS AND FUSES

AD-636 155 Field 16C, 19A
CFSTI Prices: HC$2.00 MF$0.50
Picatinny Arsenal, Dover, N. J. Engineering Science Lab.
CHARGED PARTICLE ACCELEROMETER.
Technical rept.
by James H. Fahs. Aug 66, 36p
Proj. DA-1X5427090362-12
PA-TR-3301

Descriptors: (*Accelerometers, Charged particles), Glass, Spheres, Electromagnetic fields, Oscillation, Differential equations, Partial differential equations, Electric fields, Electrodes, Relaxation time, Field theory.

An accelerometer has been proposed in which an electrically charged microscopic glass sphere acts as the proof mass. There is no electrode configuration capable of producing an electrostatic field in which such a proof mass may be contained in sta-

ble equilibrium; however, if an alternating field is produced by properly shaped electrodes, the average effect of the field on a charged particle will be to drive it toward an equilibrium position. The electric fields produced by electrodes of cylindrical shape are determined and compared with those produced by electrodes shaped like hyperbolas of revolution; and these in turn are compared with fields determined by a relaxation solution for an actual experimental configuration. The possible use of a device of this kind as an accelerometer is considered and a nomograph is presented by which theoretically possible performance characteristics may be determined. It is shown that, although an accelerometer might be produced using solely the electrodynamic containment of a charged particle, the performance would not be outstanding and more satisfactory results may be obtained by other means, relegating dynamic containment to a subsidiary role. (Author)

16D. MISSILES

AD-635 894 **Field 16D, 17A**
CFSTI Prices: HC$1.60 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
SUGGESTED SERVO CONTROL SYSTEM FOR BUMBLEBEE WITH PRELIMINARY THEORETICAL ANALYSIS.
by D. T. Sigley, and R. G. Helsel. 13 Feb 45, 20p CM-12. Bumblebee-8

Descriptors: (*Guided missiles, Stabilization systems), Control systems, Servomechanisms, Gyro stabilizers, Equations, Pitch (Motion), Yaw, Roll.

Identifiers: Bumblebee project.

A general plan is described for a servo system which automatically stabilizes the Bumblebee about the roll, yaw, and pitch axes and steers it in elevation and traverse. Equations are written governing the stabilization and steering response based upon assumptions regarding the action of the various components. General assumptions are: The response of the whole system, and each part in particular, is linear. Backlash, dead space, noise in the radar signal, leakage, and dry friction are negligible. The response of the Bee about any one of the three axes is independent of its response about the other two.

AD-635 883 **See Field 4A**

AD-635 975 **See Field 17B**

AD-636 271 **See Field 20K**

PB-170 385 **See Field 9E**

17A. ACOUSTIC DETECTION

AD-635 668 **Field 17A, 8J, 20A**
CFSTI Price: MF$1.00
Naval Oceanographic Office, Washington, D. C.
OCEANOGRAPHY FOR LONG RANGE SONAR SYSTEMS. PART I. INTRODUCTION TO OCEANOGRAPHY AND PHYSICS OF UNDERWATER SOUND IN THE SEA.
Special publication.
by Bernard K. Swanson. Feb 66, 124p SP-79

Descriptors: (*Oceanology, *Sonar), (*Underwater sound, Sound transmission), (*Acoustics, Underwater sound), Oceanographic data, Antisubmarine warfare, Instruction manuals.

By broadening the base of fundamental knowledge about the oceans, especially underwater sound, one can be assured of improvements in the art as well as a sharing of ideas and active participation in solving problems of mutual interest. This publication provides in one source all the essential elements toward a better understanding of the medium in which the military user operates. Insofar as possible the material is presented in a simplified, easily understandable format with a generous supply of pertinent illustrations to back up the text. The use of mathematics has been kept to a minimum. The material contained herein was gleaned from many existing sources (published and unpublished), edited, and adapted for ASW use in deep water (beyond the 100-fathom curve). (Author)

AD-468 869 **See Field 20A**

AD-635 582 **See Field 20D**

AD-635 660 **See Field 20A**

AD-635 765 **See Field 11F**

AD-635 803 **See Field 20A**

AD-635 894 **See Field 16D**

AD-636 168 **See Field 20A**

17B. COMMUNICATIONS

AD-283 413 **Field 17B**
CFSTI Price: HC$4.00
Marine Corps Landing Force Development Center, Quantico, Va.
RADIO SET AN/PRC-42.
Final rept.
31 Aug 62, 49p
Proj. 43-61-26

Descriptors: (*Radio communication systems, Military requirements), Communication equipment, Transmitter-receivers, Voice communication systems, High frequency, Tests, Measurement, Physical properties, Ranges (Distance), Maintenance, Climatology.

Identifiers: AN/PRC-42.

An evaluation was conducted on the developmental model of Radio Set AN/PRC-42 to determine if it met the requirements set forth in its development characteristics and to recommend changes to the development characteristics for inclusion in the service test model. Radio Set AN/PRC-42 failed to adequately satisfy the requirements of its development characteristics and tests revealed major design deficiencies in the test item with respect to RF interference, battery life, environmental effects and reliability. However, the tests established the feasibility and desirability of continuing the development program. It is recommended that the Radio Set AN/PRC-42 be redesigned as recommended in order to remedy the present deficiencies. (Author)

AD-443 800 **Field 17B**
CFSTI Prices: HC$6.00 MF$0.75
Marquardt Corp., Van Nuys, Calif.
RESEARCH INVESTIGATIONS ON PHOTO FACSIMILE TRANSMISSION TECHNIQUES.
Quarterly progress rept. no. 7, 1 Jan-31 Mar 64.
by A. Asam, W. H. Hell, W. Renold, and E. Blevis. 31 Mar 64, 67p Rept. no. 25122
Contract DA-36-039-sc-90862 (E)
Proj. DA-3A99-12-001

Descriptors: (*Facsimile transmission, Photographic recording systems), (*Photographic recording systems, Facsimile transmission), Ferromagnetic materials, Photographic recording media, Ferromagnetism, Photoconductivity, Semiconducting films, Heat treatment, Cadmium compounds, Sulfides, Electrooptical photography, Optical images, Photographic data link, Ferroelectric crystals, Electrodes, Optical scanning, Vapor plating, Vacuum apparatus, Electrical conductance, Gold, Metal films, Optical coatings, Optical equipment components, Facsimile equipment.

Development of the photoconductor, ferroelectric and electrodes was continued. Adhesion and sensitivity of the photoconductor were improved. Polycrystalline ferroelectric layers showed poor square loop properties. Development of new fabrication techniques to overcome the deficiencies of both the photoconductor and the ferroelectric has continued. An experimental setup was built to measure the square loop properties of the ferroelectric at the operating frequency of the Ferrotron image plate. Several image plates of various sizes were constructed. The compatibility of the photoconductor with the ferroelectric and the transparent electrode was not resolved completely and requires further investigation. Design of the Ferrotron readout device consisting of a light spot scanner and a printer was completed. Experiments with the optical portion of the readout device showed that the scanning beam is as small as .0008 inch in diameter. The performance of the Ferrotron feasibility model agrees with requirements of an advanced facsimile image transducer. (Author)

AD-468 606 **Field 17B**
CFSTI Prices: HC$3.00 MF$0.50
Inter-Range Instrumentation Group, White Sands Missile Range, N. Mex.
STANDARD FORMAT FOR INTER-RANGE DISTRIBUTION OF VISUAL COUNT STATUS INFORMATION.
Jan 65, 17p IRIG-109-64

Descriptors: (*Guided missile tracking systems, Counting methods), (*Guided missile ranges, Counting methods), Telemeter systems, Standardization, Vision, Bandwidth, Specifications, Communication systems, Time, Lift, Checkout procedures, Decoding, Coding.

The advent of multi-range participation in launch, tracking, and recovery missions makes it mandatory to transmit visual count status information between ranges. It was recognized early that operating concepts, and individual range requirements differed widely. It was determined that the format should contain sufficient information to meet the minimum collective requirements of all member ranges. The format information inherently allows self checking; no parity bits as such are deemed necessary.

AD-635 815 **Field 17B, 22B**
CFSTI Prices: HC$3.00 MF$0.75
Johns Hopkins Univ., Silver Spring Md. Applied Physics Lab.
DESIGN OF COMMAND LOGIC FOR A NEAR-EARTH SATELLITE.
Technical memo.
by Reginald M. Rhue. May 66, 63p TG-822
Contract NOw-62-0604-c

Descriptors: (*Command + control systems, *Satellites (Artificial)), Design.

Identifiers: Theses.

This report describes a command logic, known as the TADEX System (Tone-ADdress-EXecutive), which was designed for near earth satellites and successfully flown on DME-A (Explorer 31) and GEOS-A (Explorer 29). Audio frequency shift keying (AFSK) is used to encode an address plus sixty-four different messages. The tone bursts are transmitted to the spacecraft and decoded by the TADEX logic to control thirty-two ON/OFF relay functions. An 'address' tone gains access to the satellite and is followed by three 'executive' tone bursts. Each 'executive' tone burst is one of four 'executive' frequencies. A 'greatest-of' detector prevents high noise levels from falsely registering a tone. Post-detection integration requires that the tone burst be present for at least 0.3 second, and a power one-shot requires that the command be completed no later than 4.3 seconds after receipt of the 'address' tone. These timing controls prevent spurious tone fragments from initiating a command. (Author)

AD-635 849 **Field 17B, 9B**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
ON COGNITION OF SPEECH SOUNDS WITH THE AID OF SELF-ORGANIZING SYSTEMS WITH TWO POSITIVE FEEDBACKS.
by G. L. Otkhmezuri. 25 May 66, 24p FTD-TT-65-1851
TT-66-61798
Unedited rough draft trans. of Avtomatyka (USSR) v9 n2 p59-70 1964.

Descriptors: (*Speech recognition, Automatic), Feedback, Phonetics, Sound signals, Probability, Computer logic.

The use of self-organizing systems in the role of cognitive devices of second-degree speech is discussed. Advantages of such systems in comparison with determinative systems are shown. Block diagrams are proposed for the cognizance of sounds with the use of self-organizing systems. Methods of improving the cognizance part by the introduction of additional bonds are given. Certain experimental results obtained with the use of self-organizing systems with one (basic) positive feedback are presented.

AD-635 975 **Field 17B, 9E, 16D**
CFSTI Prices: HC$3.60 MF$0.50
Special Projects Office (Navy), Washington, D. C.
CHARACTERISTICS OF TESTING AND APPLICATION OF ELECTRICAL RESOLVERS.
8 Mar 62, 32p

Descriptors: (*Data transmission systems, *Input-output devices), Performance (Engineering), Guided missiles, Weapon systems, Analog-to-digital converters.

Identifiers: Resolvers, Poloris.

This publication presents certain considerations in the areas of both testing and application of data transmission electrical resolvers used in the Polaris Fleet Ballistic Missile Weapon System.

AD-636 143 **Field 17B, 9D**
CFSTI Prices: HC$2.00 MF$0.50
Institute for Defense Analyses, Arlington, Va. Research and Engineering Support Div.
TELECONFERENCING: EFFECTS OF COMMUNICATION MEDIUM, NETWORK, AND DISTRIBUTION OF RESOURCES.
by W. Richard Kite, and Paul C. Vitz. Mar 66, 31p Study-S-233, IDA/HQ-66-4664
Contract SD-50

Descriptors: (*Telephone communication systems, Effectiveness), (*Symposia, Telephone communication systems), Game theory, Information theory.

This study is a description of the series of experiments on teleconferencing conducted at IDA beginning in 1963 and at Stanford University in 1964-65. It focuses on the definition of problems that might be associated with the use of various media for teleconferencing. (Author)

AD-636 208 **Field 17B**
CFSTI Prices: HC$2.00 MF$0.50
Lenkurt Electric Co., Inc., San Carlos, Calif.
COMPRESSOR, WAVEFORM, TA-619 (XW-1)/FCC-17 AND RESTORER, WAVEFORM, TA-620 (XW-1)/FCC-17 (COMPANDOR).
Techanical rept., phase B.
by Forrest N. Easley, and C. Dean Charrier. 20 May 66, 50p
Contract AF 30 (635)-11188
RADC-TDR-64-370-Vol-2

Descriptors: (*Telephone communication systems, *Multiplex), Compressors, Panel boards (Electricity), Telephone signals.

Identifiers: AN/FCC-17.

For abstract, see T 66 17.

AD-636 266 **Field 17B, 9D**
CFSTI Prices: HC$2.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
MODULAR ORGANIZATION FOR NODES IN AN ADAPTIVE, HOMEOSTATIC PROCESS-ORIENTED COMMUNICATIONS SYSTEM.
Technical rept.
by Robert M. Dunn. Jun 66, 26p ECOM-2722
Proj. DA-1P6-20501-A448
Task 03

Descriptors: (*Adaptive communication systems, *Information theory), Networks, Communication systems, Digital computers, Control systems, Systems engineering, Military requirements.

Identifiers: Homeostatic communications system.

A modular organization for a communications network node is proposed. Its principal bases are: (1) message format for all information; (2) saturation processing; and (3) a limited purpose, memory-oriented processor. Philosophical principles and a formal model for the system are reviewed. The organization is then presented after a brief discussion of some significant technical assumptions. This is followed by a review of a few possible consequences of the proposed organization. In addition to any possible significance towards immediate system design, the discussion ends with the conclusion that the proposed organization is an indicator of a necessary future direction for Army communications systems development. (Author)

AD-636 282 **Field 17B, 9E**
CFSTI Prices: HC$2.00 MF$0.50
Mitre Corp., Bedford, Mass.
FIELD TEST OF THE MITRE 950 CODER/DECODER.
by John Terzian. Jul 66, 50p MTR-134
Contract AF 19 (628)-5165
Proj. AF-7560
ESD-TR-66-101

Descriptors: (*Digital systems, *Communication systems), (*Coding, Errors), (*Decoding, Errors), Instrumentation, Tests, Ionospheric propagation, Scattering, Signals, Noise.

Identifiers: Coder-decoder systems, Digital communication systems, Error correction-detection systems.

The document describes the results of a field test on a new error correction/detection equipment. The tests were held in the Caribbean area on a tropospheric scatter communications link. The tests demonstrated the ability of the equipment to operate successfully in a field environment. A technique of interleaving messages was introduced during the test series and was found to be highly effective in enhancing error correction, particularly in the presence of long error bursts. (Author)

N66-16201 **Field 17B**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Research Inst., Menlo Park, Calif.
TECHNICAL PROBLEMS ASSOCIATED WITH COMMUNICATION SATELLITES.
Supplemental rept. 1 Oct 63-30 Apr 64.
by R. G. Gould, and W. R. Vincent. 18 Jan 66, 12p
Contract NASr-49 (08)
NASA-CR-69897

Descriptors: *Channal capacity, *Communications satellite, *Echo suppression.

For abstract, see T 66 17.

N66-18023 **Field 17B**
CFSTI Prices: HC$3.00 MF$0.75
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAMS SUMMARY NO. 37-37, VOLUME III FOR THE PERIOD NOVEMBER 1, 1965 TO DECEMBER 31, 1965. THE DEEP SPACE NETWORK.
31 Jan 66, 77p JPL-SPS-37-37-Vol-3
Contract NAS7-100
NASA-CR-70636

Descriptors: *Deep space instrumentation facility (DSIF), *Tracking station, *Communication system, *Space communication.

PB-170 514 **Field 17B**
CFSTI Prices: HC$3.00 MF$0.50
Sylvania Electronic Systems, Waltham, Mass. Applied Research Lab.
FOURIER COEFFICIENTS OF SPEECH POWER SPECTRA AS MEASURED BY AUTOCORRELATION ANALYSIS.
by Harold J. Manley. 7 May 62, 3p
Journal of the Acoustical Society of America v34 n8 p1143-5 Aug 1962. NSF Scientific Documentation Project.

Descriptors: (*Fourier analysis, Speech recognition), (*Speech recognition, Correlators), Speech representation, Correlation techniques, Power series, Voice communication systems.

Time-domain speech processors, that analyze the short-time autocorrelation function in terms of a set of orthogonal functions, are shown to yield parameters that are the coefficients of a generalized Fourier cosine series representation of the speech power spectrum. Two examples are described, one using a Laguerre filter and one using a tapped delay line as in the autocorrelation Vocoder. In the case of the autocorrelation Vocoder, the derived power spectrum representation reduces to a simple Fourier cosine series in the frequency domain. (Author)

PB-170 723 **Field 17B**
CFSTI Prices: HC$1.50 MF$0.50
Columbia Univ., New York. Dept. of Electrical Engineering.
DISPLAY OF SOUND SPECTROGRAPHS IN REAL TIME.
by Cyril M. Harris, and William M. Waite. 11 Feb 63, 1p
Pub. in Journal of the Acoustical Society of America v35 n5 p729 May 1963.

Descriptors: (*Sound, Display systems), (*Display systems, Sound), Real time, Speech, Spectrum analyzers.

A technique is described for displaying sound spectrographs in real time. The patterns are obtained by scanning the rectified output of a bank of filters and feeding the output into a standard PPI oscilloscope from a radar system. Thus, no specially constructed visual display unit is required. A method of changing the frequency resolution of the patterns so obtained is described. (Author)

PB-170 726 **Field 17B**
CFSTI Prices: HC$4.00 MF$0.50
Columbia Univ., New York. Dept. of Electrical Engineering.
GAUSSIAN-FILTER SPECTRUM ANALYZER.
by Cyril M. Harris, and William M. Waite. 18 Jan 63, 4p
Pub. in the Journal of the Acoustical Society of America v35 n4 p447-51 Apr 1963. NSF Scientific Documentation Project.

Descriptors: (*Spectrum analyzers, Bandpass filters), Audiofrequency, Statistical processes, Real time.

A real-time audio-frequency spectrum analyzer is described which consists of a bank of 54 contigu-

ous bandpass filters of the Gaussian type. Up to 1000 cps, the filters have a constant bandwidth of 70 cps; above this frequency the bandwidths increase at a constant percentage of about 6.5%. The output of each filter is rectified and the resulting dc signals are scanned by a solid-state multiplexer. Thus, a single output, which is a function of the power spectrum, is made available for visual display and/or computer processing. Practical advantages of Gaussian filters are described for the analysis of transients of noise, music, or speech, and examples of the analyzer output are presented. (Author)

AD-635 633 See Field 6P

AD-635 693 See Field 5J

AD-635 944 See Field 9D

AD-636 055 See Field 9E

AD-636 207 See Field 9E

AD-636 280 See Field 14B

17E. INFRARED AND ULTRAVIOLET DETECTION

AD-428 016 See Field 20B

17G. NAVIGATION AND GUIDANCE

AD-458 325 **Field 17G, 17H**
CFSTI Price: HC$1.50
Royal Aircraft Establishment, Farnborough (England).
TECHNIQUES FOR MAKING VISUAL OBSERVATIONS OF EARTH SATELLITES.
by D. G. King-Hele. Dec 64, 42p Technical rept. TR-64087

Descriptors: (*Satellites (Artificial), Optical tracking), Binoculars, Timing devices, Clocks, Orbital trajectories, Ranges (Distance), Mathematical prediction, Time, Scanning, Identification, Atmosphere entry, Mapping.

The paper describes methods for observing earth satellites in a quick and simple manner, with binoculars and stop watch: an accuracy of about 0.1 sec in time and 0.05 degrees in direction can be achieved. The uses of the observations for orbital determinations and other purposes are outlined. (Author)

AD-465 330 **Field 17G**
CFSTI Prices: HC$4.00 MF$0.75
Astro-Space Labs., Inc., Huntsville, Ala.
STUDY AND PROTOTYPE MODEL DESIGN OF A MINIATURIZED GYROCOMPASS.
Final engineering rept., 18 Jun 64-15 May 65.
by R. G. Mapes. 15 May 65, 98p ASL-FE-65-21
Contract DA-44-009-AMC-673 (X)
Proj. DA-1S643315D57801

Descriptors: (*Gyro compasses, Design), (*Direction finding, Instrumentation), Feasibility studies, Azimuth, Army operations, Human engineering, Spinning, Spheres, Gas bearings, Gyroscopes, Optical instruments.

The report presents the studies and investigations performed to determine the feasibility of and the techniques and instrumentation necessary for employing gyroscopic principles in a small, rugged instrument which can be used by Army reconnaissance and observational troops to determine azimuth to visible landmarks or other appropriate references for obtaining directional orientation. The design, fabrication and test of a laboratory model vortex-centered spinning-sphere gyro was conducted, along with a theoretical investigation of the hydrodynamic equations of motion. It was established that a fluid, vortex-centered gyro of a size and weight to meet this requirement would have a coupling time constant which was too short for north-seeking applications. A miniature, gas bearing suspended spinning-sphere gyro design was formulated which yielded an ideal solution for this north-seeking application. This basic inertial sensor was integrated with the various other subsystems to yield an overall design configuration which offers a very attractive mechanization technique for this application. The feasibility of the instrument was firmly established and it is recommended that a hardware fabrication and test program be implemented. (Author)

N66-15413 **Field 17G**
CFSTI Prices: HC$1.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Experimental Astronomy Lab.
STATISTICAL FILTERING OF SPACE NAVIGATION MEASUREMENTS.
by J. E. Potter, and R. G. Stern. Aug 63, 19p RE-3
Grant NsG-254
NASA-CR-69287
Presented at the AIAA Guidance and Control Conf., Cambridge, Aug 12-14 1963.

Descriptors: *Space navigation, *State vector, *Statistical analysis.

PB-170 760 **Field 17G, 17I**
CFSTI Prices: HC$1.50 MF$0.75
National Aviation Facilities Experimental Center, Atlantic City, N. J.
IMPROVED EQUIPMENT ARRANGEMENTS FOR TRACON ROOMS.
Final rept.
by J. Roy Bradley Jr. Apr 66, 80p
Proj. 150-516-01X
RD-66-22
Availability: Original document in color until exhausted.

Descriptors: (*Air traffic control terminal areas, Radar equipment), (*Radar equipment, Air traffic control terminal areas), Display systems, Lighting equipment, Airport radar systems.

The report presents the results of a research project conducted to recommend environmental and hardware improvements for Terminal Radar Control (TRACON) Rooms. Through the use of laboratory techniques a simulated TRACON room was established to test environmental concepts and equipments. Field controllers' opinions and recommendations, with those of the project members, were used as a basis for determining the advantages or disadvantages of particular equipments, their locations, and console modifications and configurations. Recommendations include: Operating position arrangement concepts; placement of auxiliary equipment and controls; improved lighting techniques and information display devices; and a new design for ATC TRACON room consoles. (Author)

PB-170 761 **Field 17G**
CFSTI Prices: HC$1.50 MF$0.50
Federal Aviation Agency, Atlantic City, N. J. Systems Research and Development Service.
EVALUATION OF LORAN A AND C SIMULATOR.
Final rept.
by George H. Quinn. Aug 65, 43p SRDS-RD-65-101
Proj. FAA-350-102-03V

Descriptors: (*Simulators, Loran), (*Loran, Simulators), Loran equipment, Test equipment, Reliability, Radio signals, Flight testing, Airborne.

This report contains the results of an evaluation of a Loran A and C Simulator designed to provide signals for dynamic testing of Loran receivers and ancillary equipment. Equipment difficulties discovered during the evaluation are described, and modifications that would improve the Simulator usefulness are suggested. The Simulator output was the equivalent of signals from both Loran-A and Loran-C stations. This output involved selected simulation of the existing East Coast Loran-C triad or two Loran-A station pairs and movement of an aircraft through these Loran signal coverage areas. The simulated signal included variable aircraft speed, fixed altitudes, radio frequency noise, signal strength variations, CW interference signals, and sky waves. Use of the Simulator for dynamic laboratory testing of Loran A and C Receivers is recommended including equipment modifications and revisions to the instruction manual. (Author)

PB-170 385 See Field 9E

PB-170 515 See Field 1B

PB-170 598 See Field 9C

PB-170 825 See Field 5E

17H. OPTICAL DETECTION

AD-636 142 **Field 17H, 20F, 8K, 20A K**
CFSTI Prices: HC$2.00 MF$0.50
Institute for Defense Analyses, Arlington, Va. Research and Engineering Support Div.
A WAVE FRONT RECONSTRUCTION PROCESS FOR A DISPLAY OF THE MULTIPLE BEAMS OF SEISMIC AND OTHER ARRAYS.
Research paper.
by W. Duane Montgomery. Apr 66, 32p RP-P-249, IDA/HQ-66-4822
Contract SD-50

Descriptors: (*Optical scanning, Mechanical waves), (*Seismic waves, Optical scanning), (*Sound, Optical scanning), (*Display systems, Mechanical waves), Optics, Optical equipment, Acoustics.

Identifiers: Holography.

The passive planar arrays used in receiving sonic waves through the earth or water, or those used in radio astronomy use mechanical or electronic scanning in order to observe a large solid angle such as 2pi steradians. The purpose of the present paper is to develop a method for obtaining a real-time visual display of such wave fields. It is analogous to the use of a wide-angle lens for viewing large solid angles in the visible spectrum. The method uses a recently developed technique of incoherent holography as an analog, with the important difference that the sampling aspect of an array enables one to obviate any film processing stage. An appendix treats a few problems for seismic arrays. (Author)

AD-458 325 See Field 17G

17I. RADAR DETECTION

AD-635 913 **Field 17I, 9A**
CFSTI Prices: HC$1.00 MF$0.50
Harry Diamond Labs., Washington, D. C.
SUPPRESSION OF MODULATION VOLTAGE ON THE RF TERMINALS OF A DIODE SWITCH.
by T. H. Mak, and R. V. Garver. Apr 66, 23p TR-1319
Projs. HDL-28300, DA-1C014501B31A

Descriptors: (*Radar signals, Pulse modulation), (*Electron switches, Diodes), Microwave frequency, Filters (Electromagnetic wave), Transients, Microwave equipment, Radar receivers, Attenuation.

An analysis is made of a method for pulse-modulating a microwave signal so that the rise and fall times of the modulated pulse is on the order of 1 nsec. The components used are microwave switching diodes which have a switching time much less than 1 nsec and a filter circuit which helps to re-

duce switching transients emerging from signal and source terminals of the switch. Analysis relates the suppression of the switching transients to the number of filter elements and switching times. (Author)

AD-636 169 **Field 17I**
CFSTI Prices: HC$1.00 MF$0.50
Center for Naval Analyses, Washington, D. C.
A HELICOPTER VERSUS SUBMARINE SEARCH GAME.
by J. M. Danskin. 9 Jun 66, 19p Research contribution-24
Contract Nonr-3732 (00)

Descriptors: (*Game theory, *Search radar), Helicopters, Submarines, Optimization, Sonar.

How should helicopters use their dipping sonar so as to search for a submarine, now submerged and attempting to escape, which had been sighted a short time before. By some approximations to reality and a shift in the point of view the problem is brought to a simple two-person zero-sum game in which one side juggles areas and the other probability distributions. The solutions are exhibited and proved to be solutions by direct application of the definition of optimal strategies for a game. The solution may be understood with very little mathematical knowledge.It turns out that the helicopters should, generally speaking, spiral inward in the relative speed circle. (Author)

N66-16092 **Field 17I**
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
RADAR CROSS SECTION AND OPTICAL RADIATION FROM THE TRAILBLAZER I IA 9 DEG HALF-ANGLE BLUNT NOSE CONE DURING HYPERSONIC REENTRY.
by W. L. Darnell. Feb 66, 58p NASA-TN-D-3214

Descriptors: *Nose cone, *Blunt body, *Hypersonic reentry, *Radar cross section, *Radiation measurement.

For abstract, see T 66 17.

N66-17255 **Field 17I**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
THE GODDARD RANGE AND RANGE RATE TRACKING SYSTEM-CONCEPT, DESIGN AND PERFORMANCE.
by E. J. Baghdady, and G. C. Kronmiller Jr. Oct 65, 80p NASA-TM-X-55382, X-531-65-403

Descriptors: *Performance characteristics, *Range and range rate tracking, *Spacecraft position indicator.

PB-170 756 **Field 17I, 4B**
CFSTI Prices: HC$1.50 MF$0.50
National Severe Storms Lab., Norman, Okla.
STATISTICAL PROPERTIES OF RADAR ECHO PATTERNS AND THE RADAR ECHO PROCESS. THE ROLE OF THE KUTTA-JOUKOWSKI FORCE IN CLOUD SYSTEMS WITH CIRCULATION.
by Larry Armijo, and Joseph L. Goldman. Jun 66, 38p
WB-TN-48-NSSL-27

Descriptors: (*Meteorological radar, Radar echo areas), (*Radar echo areas, Statistical analysis), (*Meteorological phenomena, Force (Mechanics)), Clouds.

A stochastic process for explaining the statistical properties of radar echo patterns in a given direction is defined and investigated. This is called the radar echo process. Earlier work by Kessler, Russo and Cole, who used the random telegraph process as a model for the statistical properties of radar echo patterns, led to certain discrepancies. The radar echo process is a much more satisfactory model for these statistical properties and completely explains the discrepancies due to the random telegraph assumption. The new process, being coverage dependent, reduces to the random telegraph process for fifty percent coverage, is wide sense stationary and ergodic, has an exponential normalized autocorrelation function, implies realistic distributions of lengths, and is formulated in terms of conditional probabilities which are explicitly expressible in terms of elementary functions. (Armijo) The classical Kutta-Joukowski Force produces acceleration of a translating cylinder immersed in fluid with circulation, in a direction normal to the cylinder motion. The motion of large thunderstorms has been observed to deviate systematically from environmental winds and the possible association of the K-J Force with storm motions is discussed. (Goldman)

PB-170 762 **Field 17I**
CFSTI Prices: HC$6.00 MF$1.25
Federal Aviation Agency, Washington, D. C. Systems Research and Development Service.
DEVELOPMENT OF MANUAL RADAR INTERFERENCE PREDICTION MODEL.
Final rept.
by Robert D. Holland, and Denver W. Ritchey.
May 66, 236p SRDS-RD-66-33
Proj. FAA-231-001-10F

Descriptors: (*Radar interference, Mathematical prediction), Mathematical models, Wave transmission, Radar signals, Radar targets, Detection, Graphics, Radar receivers.

This report describes the development and application of a theoretical model developed to manually predict the RF interference that a radar receiver may be subjected to and the effect this interference input might have on the Common Digitizer. The RF portion of the prediction is made in two steps. A rough cull is accomplished utilizing essentially power and distance to eliminate as many equipments as possible from consideration and then more detailed calculations are accomplished on only those emitters which are potential interference sources. The total amount of interference is examined to determine the effect on the probability of detection. Curves have been plotted showing that as the amount of interference increases the probability of detection decreases. The effect is much more pronounced for targets with small signal-to-noise ratios. The effects of interference whose PRF is nearly equal to or almost harmonically related to the operating rate of the Common Digitizer is examined. Inputs of this nature can cause the Common Digitizer to produce a false target due to the time relationship between the period of the interfering signal and the period of the Common Digitizer. (Author)

PB-170 760 **See Field 17G**

17J. SEISMIC DETECTION

AD-635 571 **See Field 8K**

AD-636 144 **See Field 8K**

18A. FUSION DEVICES (THERMONUCLEAR)

AD-426 798 **Field 18A**
CFSTI Price: HC$3.00
Defense Atomic Support Agency, Albuquerque, N. Mex. Field Command.
SUMMARY OF SHERWOOD ACTIVITIES.
15 Aug 63, 91p

Descriptors: (*Thermonuclear reactions, Nuclear physics laboratories), Nuclear reactions, Nuclear reactors, Plasma physics, Magnetic fields, Gas ionization, Electron guns, Fast neutrons, Plasma jets, Magnethydrodynamics, Cyclotrons.

Project SHERWOOD is the United States program to develop the means to control thermonuclear fusion reactions for peaceful purposes.

AD-635 779 **Field 18A, 20I**
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Corp., El Segundo, Calif. Technical Operations.
TRI-DIMENSIONAL PLASMA COMPRESSION ASSEMBLIES.
by V. Josephson. Dec 65, 17p TDR-669 (6550-10)-2
Contract AF 04 (695)-669
SSD-TR-66-108

Descriptors: (*Magnetic pinch, Instrumentation), (*Thermonuclear reactions, Containment), Compressive properties, Plasma medium, High-temperature research, Deuterium, Configuration, Neutrons.

Identifiers: Controlled thermonuclear fusion.

Two configurations for achieving tri-dimensional plasma compression were designed, and preliminary testing was accomplished on one. The results indicate that the configuration does produce very high plasma temperatures as a result of the compression; this is evidenced by the sharp (< 1 microsec), intense (>10 to the 9th power) burst of neutrons resulting from the compression and heating of a deuterium plasma to fusion temperatures. (Author)

LA-3487 **Field 18A**
CFSTI Prices: HC$5.00 MF$1.00
Los Alamos Scientific Lab., N. Mex.
PROPOSAL FOR A TOROIDAL THETA-PINCH (SCYLLAC).
Mar 66, 175p
Contract W-7405-eng-36

Descriptors: (*Thermonuclear reactions, Magnetic pinch).

For abstract, see N 20 15.

AD-636 120 **See Field 20I**

18B. ISOTOPES

AD-635 547 **Field 18B, 18H**
CFSTI Prices: HC$2.00 MF$0.50
Stanford Research Inst., Menlo Park, Calif.
FALLOUT SIMULANT DEVELOPMENT: THE SORPTION REACTIONS OF CERIUM, CESIUM, RUTHENIUM, STRONTIUM, AND ZIRCONIUM-NIOBIUM.
by William B. Lane. Nov 65, 34p
Contract N228 (62479)65414
Proj. SRI-MU-5068
Task 3211B
SRI-5068.

Descriptors: (*Radioactive fallout, Simulation), (*Radioactive isotopes, *Sorption), Cerium, Cesium, Ruthenium, Strontium, Zirconium, Niobium, Solubility, Food, Radiological contamination, Tracer studies.

The report describes the preparation of synthetic fallout. Methods are discussed for simulating selected properties of radioactive fallout so that experiments can be conducted to evaluate radiological hazards. The experiments measured solubility of radionuclides which would be available to cycle in the food chains. Heating the fallout particles to high temperatures reduced the solubility of all nuclides studied. The methods described can be used by other researchers to prepare synthetic fallout with selected solubility and availability properties. (Author)

AD-635 643 **Field 18B**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.

ELEMENTARY INTRODUCTION TO ISOTOPE SEPARATION.
by Dennis Holliday, and Milton S. Plesset. Jun 66, 38p RM-4938-PR
Contract AF 49 (638)-1700

Descriptors: (*Isotope separation, Instruction manuals), Isotopes, Centrifuge separation, Gaseous diffusion separation, Magnetic separation, Thermal diffusion separation, Reactor fuel enrichment, Nuclear physics.

A discussion of six isotope separation processes; (1) the separation nozzle, (2) sweep diffusion, (3) thermal diffusion, (4) electromagnetic separation, (5) gaseous diffusion, and (6) centrifugation. The emphasis is on the physical principles involved in each process and on the use of these physical differences. Because five of the processes involve devices that give individually a very small separation, a cascade of these devices is required to effect large separations. The steady-state theory of such cascades is also discussed.

BNL-943 **See Field 5B**

CONF-651111 **See Field 6O**

18C. NUCLEAR EXPLOSIONS

AD-357 501 **Field 18C, 19D**
CFSTI Price: HC$6.00
Naval Ordnance Lab., White Oak, Md. Explosion Dynamics Div.
MODEL TESTS AND SCALING.
by Hans G. Snay. 1 Dec 64, 219p
Proj. NOL-429
NOL-TR-63-257, DASA-1240-I (3)

Descriptors: (*Underwater explosions, Model tests), (*Nuclear explosions, Model tests), Explosion bubbles, Explosion effects, Shock waves, Surfaces.

The scaling analysis of underwater explosion phenomena is described. Particular emphasis is given to the possibilities of studying nuclear explosions by means of small scale model tests. The concept of 'consistent similitude' is stressed and is compared with dimensional analysis. The discussion covers most underwater explosion phenomena. The scaling of bubble phenomena is surveyed in detail. A rule-of-thumb is given for the scaling of field model explosions, i.e., tests in open water. (Author)

PNE-481 **See Field 6F**

18D. NUCLEAR INSTRUMENTATION

AD-635 655 **Field 18D, 7E, 11I**
CFSTI Prices: HC$1.00 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
APPLICATION OF FAST NEUTRON ACTIVATION ANALYSIS TO POLYMER DOSIMETRY.
by Arthur D. Coates, and Joe A. Swisher. Mar 66, 20p BRL-1312
Proj. RDT/E-1No22601A086

Descriptors: (*Polymers, *Neutron activation), (*Polyethylene plastics, *Radioactivation analysis), Gamma rays, Dosage, Films, Oxygen, Radiation damage, Infrared spectroscopy.

Fast neutron activation analysis was used to measure the gamma dose absorbed by a polymer. A series of low density polyethylene films was irradiated by cobalt-60 gamma rays in the presence of air. The oxygen content of the polymer films increased with increasing dose. The increase in oxygen content of each film was monitored at 1720/cm by infrared spectroscopy. The oxygen increase also was monitored by measuring the activation of oxygen-16. This latter method employs fast neutron activation of oxygen-16 and the measurement of the emitted radiation to determine gamma dose. The results of both methods of dosimetry are presented, and the improvements offered by the neutron activation technique are indicated. (Author)

AD-635 692 **Field 18D, 20H, 7E**
CFSTI Prices: HC$1.00 MF$0.50
Naval Air Engineering Center, Philadelphia, Pa. Aeronautical Materials Lab.
NEUTRON ACTIVATION ANALYSIS.
Progress rept.
by A. L. Glass, and Edwin S. Tankins. 24 May 66, 10p PR-1
Proj. NAEC-AML (39)R360FR101

Descriptors: (*Neutron activation, Instrumentation), (*Radioactivation analysis, Instrumentation), Shielding, Nuclear physics laboratories, Neutron beams, Neutron counters.

The object of the initial phase of the investigation was to obtain and install a system with adequate shielding for neutron activation analysis and to provide the additional laboratory facilities for its use. A description of the equipment obtained, with the shielding that was erected is given. (Author)

AD-635 819 **Field 18D**
CFSTI Prices: HC$5.00 MF$1.00
Edgerton, Germeshausen and Grier, Inc. Santa Barbara, Calif.
NEUTRON AND GAMMA DOSIMETRY MEASUREMENTS AT THE AFRRI/DASA TRIGA REACTOR.
by J. A. Sayeg. Nov 65, 177p Rept. no. S-260-R
Contract DA-49-146-XZ-226
AFRRI-CR-65-6

Descriptors: (*Neutrons, Radiological dosage), (*Gamma rays, Radiological dosage), (*Dosimeters, Design), Research reactors, Fast neutrons, Neutron detectors, Proportional counters, Ionization chambers, Thermal neutrons, Foils, Radiation measurement systems, Plutonium, Neptunium, Uranium, Sulfur, Graphite, Silver compounds, Phosphates, Carbon dioxide, Cadmium, Gold, Indium.

Identifiers: TRIGA reactors.

Topics include: fast neutron dosimetry (threshold detectors (Pu239 (surrounded by B10), Np237, U238, and S32), Hurst proportional counter, tissue equivalent and graphite-CO2 ionization chambers;); Gamma ray dosimetry (silver phosphate glass rods, graphite-CO2 ionization chamber, tetrachloroethylene chemical dosimeters); thermal neutron dosimetry (bare and cadmium covered gold and indium foils).

AD-635 882 **Field 18D**
CFSTI Prices: HC$2.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
A TEMPERATURE COMPENSATING PREAMPLIFIER FOR DRIVING LONG COAXIAL LINES IN SCINTILLATION SPECTROSCOPY APPLICATIONS.
by Raymond A. Taylor, and Raphael F. Ehat. 11 Feb 66, 38p USNRDL-TR-1021
SF-011-05-11
Task 0501

Descriptors: (*Gamma spectroscopy, Instrumentation), (*Scintillation counters, *Preamplifiers), (*Nuclear radiation spectrometers, Preamplifiers), Transmission lines, Coaxial cables, Thermisistors, Photomultipliers, Mobile, Demodulators.

A temperature compensating transistorized, linear, unity gain preamplifier was designed and constructed for use as a coaxial cable line driver in a mobile gamma-ray scintillation spectrometry system. Its differential linearity was better than plus or minus 1 percent with input signals up to 3 volts when loaded with a terminated 93-Ohm, 500-ft. coaxial cable. The use of a simple thermistor temperature compensating netowrk in the preamplifier of the detector-preamplifier package gave a system gain variation normalized at 25C, as a function of temperature of less than +4 percent between 0C and 25C and less than - 1 percent between 25C and 50C. (Author)

AD-636 206 **Field 18D, 15C**
CFSTI Prices: HC$2.00 MF$0.50
Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
A FIELD DETECTOR STATION FOR THE DASA FALLOUT AND TRANSIT DOSE RATE MEASUREMENT SYSTEM.
by Donald A. Paynter. Aug 66, 37p
Contract DA-49-146-XZ-292
NDL-TR-71-Suppl., DASA-1688-Suppl.
See also AD-627 077.

Descriptors: (*Radioactive fallout, *Radiation measurement systems), (*Solid state physics, Radiation measurement systems), Dose rate, Real time, Data processing systems, Data transmission systems, Telemeter systems, Nuclear explosions.

This report describes a solid-state version of the detector station electronics used in the DASA Fallout and Transit Dose Rate Measurement System. The basic report, NDL-TR-71 (AD-627 077), dated Dec 1965, describes the Measurement System. The performance of the solid-state version equals or exceeds that of the experimental vacuum tube model it replaces, and it reflects both cost and electrical economies. A by-product of the design is the availability of a frequency modulated ac output signal that can be readily transmitted, recorded, and digitized without intermediate signal processors as would be required with dc data signals. The system's resulting economies are outlined. (Author)

N66-15681 **Field 18D**
CFSTI Prices: HC$3.00 MF$0.75
Department of Atomic Energy, Bombay (India).
VAN DE GRAAFF LABORATORY PROGRESS REPORT, 1 JANUARY-31 DECEMBER 1964.
by T. P. David. 1965, 75p AEET-214

Descriptors: *Angular correlation, *Nuclear reaction, *Instrumentation, *Van De Graaff accelerator.

For abstract, see T 66 17.

N66-16142 **Field 18D**
CFSTI Prices: HC$2.00 MF$0.50
European Atomic Energy Community, Brussels (Belgium).
NEUTRON SPECTRA MEASUREMENT IN FAST REACTORS USING FOILS DETECTORS. PART I. THEORETICAL CONSIDERATIONS.
by R. Dierckx. 1965, 37p EUR-2532.E

Descriptors: *Detector, *Fast reactor, *Neutron spectrum, *Energy spectrum, *Foil.

N66-18445 **Field 18D**
CFSTI Prices: HC$1.00 MF$0.50
Atomic Energy of Canada, Ltd., Chalk River (Ontario).
AN AUTOMATIC PROGRAM UNIT FOR TIME CONTROLLED COUNTING WITH THE CHALK RIVER 100 CHANNEL KICKSORTER.
by W. D. Howell, and W. R. J. Shorey. Nov 65, 22p ELI-93, AECL-2509

Descriptors: *Control system, *Radiation counter, *Automatic control.

UCRL-14593 **Field 18D**
CFSTI Prices: HC$1.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.

DEVELOPMENT AND APPLICATION OF THE INTRINSIC THERMOCOUPLE FOR FAST RESPONSE.
by Gerald R. Dittbenner. 9 Mar 66, 11p
Contract W-7405-eng-48

Descriptors: (*Thermocouples, Design), (*Fission products, Temperature).

For abstract, see N 20 15.

AD-635 836 See Field 7A

ANL-7100 See Field 20M

BNL-943 See Field 5B

NAA-SR-11355 See Field 9B

ORNL-NSIC-16 See Field 5B

UCRL-14680 See Field 6R

18E. NUCLEAR POWER PLANTS

IDO-28655 Field 18E
CFSTI Prices: HC$6.00 MF$1.25
Aerojet-General Nucleonics, San Ramon, Calif.
ARMY GAS-COOLED REACTOR SYSTEMS PROGRAM.
Final report.
Mar 66, 238p
Contract AT (10-1)-880

Descriptors: (*Gas-cooled reactors, Nuclear power plants).

For abstract, see N 20 15.

18F. RADIATION SHIELDING AND PROTECTION

N66-12185 Field 18F
CFSTI Prices: HC$1.00 MF$0.50
Advanced Research Corp., Atlanta, Ga.
INVESTIGATION OF BREMSSTRAHLUNG PRODUCTION IN A SHIELDING MATERIAL.
May 65, 16p
Contract NAS8-11083
NASA-CR-68107

Descriptors: *Bremsstrahlung, *Electron source, *Isotropic medium, *Slab.

N66-15586 Field 18F
CFSTI Prices: HC$4.00 MF$1.00
Lockheed Nuclear Products, Marietta, Ga.
DATA COMPILATION AND EVALUATION OF SPACE SHIELDING PROBLEMS. VOLUME I. RANGE AND STOPPING POWER DATA.
by C. W. Hill, W. B. Ritchie, and K. M. Simpson.
1965, 149p ER-7777-Vol-I
NASA-CR-69434

Descriptors: *Energy loss, *Shielding, *Stopping power, *Penetrating particle.

N66-15587 Field 18F
CFSTI Prices: HC$4.00 MF$1.00
Lockheed Nuclear Products, Marietta, Ga.
DATA COMPILATION AND EVALUATION OF SPACE SHIELDING PROBLEMS. VOLUME II. DOSE CALCULATIONS IN SPACE VEHICLES.
by C. W. Hill, W. B. Ritchie, and K. M. Simpson.
Aug 65, 130p ER-7777-Vol-2
Contract NAS8-11164
NASA-CR-69435

Descriptors: *Computer program, *Proton irradiation, *Radiation dose, *Alpha radiation, *Spacecraft configuration.

ORNL-3943 See Field 18J

18G. RADIOACTIVE WASTES

RFP-735 Field 18G, 6R
CFSTI Prices: HC$2.00 MF$0.50
Rocky Flats Div., Dow Chemical Co., Golden, Colo.
INCINERATION OF PLUTONIUM CONTAMINATED WASTE MATERIALS, A PRELIMINARY STUDY FOR REPLACEMENT OF THE EXISTING ROCKY FLATS INCINERATOR.
by R. S. Foster. 9 May 66, 27p
Contract AT (29-1)-1106

Descriptors: (*Incenerators, Radioactive waste), (*Radioactive waste, Disposal).

For abstract, see N 20 15.

IDO-14661 See Field 7A

18H. RADIOACTIVITY

AD-635 583 Field 18H, 9A, 7E
CFSTI Prices: HC$3.00 MF$0.75
Hughes Aircraft Co., Fullerton, Calif.
SURFACE EFFECTS OF RADIATION ON MICROELECTRONIC DEVICES: PART II.
Final rept., pt-2, 15 Nov 65-15 Apr 66.
by Daniel Binder, Barbara M. Kuehne, and Donald A.Steele. 15 Apr 66, 80p FR-66-17-186
Contract N228 (62479)68466
Proj. SR-007-11-01
Task 0551
USNRDL-TRC-44
See also AD-632 112.

Descriptors: (*Radiation damage, Electronic (Equipment)), (*Transistors, Radiation damage), (*Integrated circuits, Radiation damage), (*Microminiaturization (Electronics), Radiation damage), Surface properties, Films, Silicon, Electron bombardment, Radiation chemistry, Gamma rays.

Identifiers: Field-effect transistors, Metal oxide semiconductors.

Both intermediate and semipermanent effects of ionizing radiation were studied for three types of metal-oxide-silicon field effect transistors (MOSFET's): the n-channel 2N4038 (enhancement), the p-channel 2N3638 (enhancement), and an n-channel silicon-on-sapphire thin film (depletion) device. Intermediate effects were studied by the observation of conductivity changes as a function of successive irradiations at various bias points. Both conductivity changes and changes in transconductance were observed in the study of semipermanent effects resulting from each irradiation. (Author)

HASL-170 Field 18H, 6R
CFSTI Prices: HC$3.00 MF$0.50
New York Operations Office (AEC), N. Y. Health and Safety Lab.
FURTHER STUDIES OF EXTERNAL ENVIRONMENTAL RADIATION.
by H. L. Beck, W. M. Lowder, and B. G. Bennett.
Mar 66, 53p

Descriptors: (*Radioactivity, Measurement).

For abstract, see N 20 15.

AD-477 032 See Field 9E

AD-477 033 See Field 9E

AD-635 547 See Field 18B

AD-635 844 See Field 18J

BNWL-113-15 See Field 5B

K-1663 See Field 18J

WCAP-3385-54 See Field 18I

18I. REACTOR ENGINEERING AND OPERATION

N66-13186 Field 18I
CFSTI Prices: HC$7.20 MF$2.00
Atomics International, Canoga Park, Calif.
AEC UNCLASSIFIED PROGRAMS. ANNUAL TECHNICAL PROGRESS REPORT, FISCAL YEAR 1965.
10 Nov 65, 418p
Contract AT (11-1)-GEN-8
NAA-SR-11450

Descriptors: *Sodium reactor experiment (SRE), *Reactor technology.

PB-170 711 Field 18I
CFSTI Prices: HC$4.00 MF$0.50
Institute of Technology, Otaniemi (Finland).
CONSTRUCTION AND PERFORMANCE OF A COLD NEUTRON SOURCE.
by Eino Tunkelo. 1966, 52p
Pub. in Acta Polytechnica Scandinavica, Physics including Nucleonics Series No. 38, Helsinki 1966.

Descriptors: (*Neutrons, Production), (*Nuclear reactors, Neutrons), Performance (Engineering), Reactor moderators, Blackbody radiation, Reactor coolants, Methane, Hydrogen, Neutron beams, Finland.

The description is presented of a cold neutron source installed in a tangentially piercing beam tube of the FiR 1 reactor of Institute of Technology, Otaniemi. The moderator chamber is given a 'black body radiator'-like geometry in order to enhance the moderation of neutrons. The coolant is separated from the moderator to enable use of different liquids as moderator and coolant. The influence of the moderating material and temperature as well as of the shape and size of moderator is discussed. Cryogenic and safety considerations are also presented. The performance of the cold neutron source is given in terms of the intensities and spectra of emerging neutrons. Methane (at 78K) and liquid hydrogen at 20K) are used as moderators giving an intensity of 6.7x10 neutrons/sec and 13,000,000 neutrons/sec for the beryllium filtered beam 3x4 sq cm. (Author)

WAPD-MRP-116 Field 18I, 18J, 18K, 18L
CFSTI Prices: HC$4.00 MF$0.75
Bettis Atomic Power Lab., Pittsburgh, Pa.
PRESSURIZED WATER REACTOR (PWR) PROJECT.
Technical progress rept., 22 Jan-22 Apr 66.
1966, 101p
Contract AT (11-1)-GEN-14

Descriptors: (*Pressurized water reactors, Design).

For abstract, see N 20 15.

WCAP-3385-51 Field 18I, 18J, 18K, 18L
CFSTI Prices: HC$4.00 MF$1.75
Westinghouse Electric Corp., Pittsburgh, Pa. Atomic Power Div.
SAXTON PLUTONIUM PROGRAM. NUCLEAR DESIGN OF THE SAXTON PARTIAL PLUTONIUM CORE.
by W. L. Orr, H. I. Sternberg, P. Deramaix, and A. J. Impink. Dec 65, 347p
Contract AT (30-1)-3385
EURAEC1490

Descriptors: (*Reactor cores, Plutonium), (*Plutonium, Reactor cores).

For abstract, see N 20 15.

WCAP-3385-53 Field 18I, 11F, 18J, 18L
CFSTI Prices: HC$4.00 MF$0.75
Westinghouse Electric Corp., Pittsburgh, Pa. Atomic Power Div.

SAXTON PLUTONIUM PROGRAM. MATERIALS DESIGN AND FABRICATION OF THE SAXTON PARTIAL PLUTONIUM CORE.
by A. Biancheria, R. N. Stanutz, R. J. Allio, and R. G. Rose. Dec 65, 116p
Contract AT (30-1)-3385
EURAEC492

Descriptors: (*Reactor cores, Plutonium), (*Plutonium, Reactor cores).

For abstract, see N 20 15.

WCAP-3385-54 **Field 18I, 18H, 18J, 18L**
CFSTI Prices: HC$7.00 MF$1.50
Westinghouse Electric Corp., Pittsburgh, Pa. Atomic Power Div.
SAXTON PLUTONIUM PROGRAM. CRITICAL EXPERIMENTS FOR THE SAXTON PARTIAL PLUTONIUM CORE.
by E. G. Taylor. Dec 65, 308p
Contract AT (30-1)-3385
EURAEC1493

Descriptors: (*Reactor cores, Plutonium), (*Plutonium, Reactor cores).

For abstract, see N 20 15.

AI-CE-15 **See Field 7C**

IDO-14661 **See Field 7A**

LA-3448 **See Field 6R**

NAA-SR-11355 **See Field 9B**

ORNL-NSIC-16 **See Field 5B**

ORNL-3831 **See Field 11F**

ORNL-3943 **See Field 18J**

ORNL-3962 **See Field 7A**

WASH-1066 **See Field 18K**

18J. REACTOR MATERIALS

AD-635 844 **Field 18J, 18H, 11F**
CFSTI Prices: HC$3.00 MF$0.75
Naval Research Lab., Washington, D. C.
IRRADIATION EFFECTS ON REACTOR STRUCTURAL MATERIALS 1 FEBRUARY - 30 APRIL 1966.
Quarterly progress rept.
by Lendell E. Steele, J. Russell Hawthorne, and Charles Z. Serpan Jr. 15 May 66, 63p NRL-MR-1700
Contract AT (49-5)-2110
Projs. RR007-01-46-5409, SF020-01-05-0858
See also AD-630 937.

Descriptors: (*Reactor materials, Steel), (*Steel, Radiation damage), (*Radiation damage, Reactor materials), Nickel alloys, Embrittlement, Ductility, Chromium alloys, Molybdenum alloys, Stress relieving, Sensitivity, Microstructure, Stainless steel, Notch sensitivity, Heat treatment, Transition temperature, Neutrons.

Identifiers: Steel A302-B.

The investigation includes the following: (1) The relative radiation sensitivity of A302-B steels prepared by special melting and heat treatment practice, (2) The evaluation of nickel content as a radiation sensitivity variable, (3) Comparative irradiation enbrittlement of selected higher strength steels, and (4) The effect of neutron spectra upon the observed changes in the notch ductility of irradiated steels. (Author)

BMI-1768 **Field 18J**
CFSTI Prices: HC$6.00 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF CERAMIC-COATED-PARTICLE NUCLEAR FUELS. SUMMARY REPORT.
by Charles W. Townley. 25 Apr 66, 95p
Contract W-7405-eng-92

Descriptors: (*Reactor fuels, Nuclear particles).

For abstract, see N 20 15.

BMI-1772 **Field 18J**
CFSTI Prices: HC$2.00 MF$0.50
Battelle Memorial Inst., Columbus, Ohio.
ETR IRRADIATIONS OF PYROLYTIC-CARBON-COATED FUEL PARTICLES.
by Neil E. Miller, Robert L. Martin, and Harvey S. Rosenberg. 11 May 66, 35p
Contract W-7405-eng-92

Descriptors: (*Reactor fuels, Nuclear properties).

For abstract, see N 20 15.

K-1663 **Field 18J, 18H**
CFSTI Prices: HC$1.00 MF$0.50
Oak Ridge Gaseous Diffusion Plant, Tenn.
HYDROGEN MODERATION - A PRIMARY NUCLEAR SAFETY CONTROL FOR HANDLING AND TRANSPORTING LOW-ENRICHMENT UF6.
by C. E. Newlon, and A. J. Mallett. 31 May 66, 20p
Contract W-7405-eng-26

Descriptors: (*Reactor fuels, Handling), (*Transportation, Reactor fuels).

For abstract, see N 20 15.

ORNL-3930 **Field 18J**
CFSTI Prices: HC$3.00 MF$0.75
Oak Ridge National Lab., Tenn.
AN EVALUATION OF UO2 IRRADIATED AT 1600 TO 2400 DEG C.
by C. Michelson, J. L. Scott, and E. L. Long Jr. May 66, 66p
Contract W-7405-eng-26

Descriptors: (*Uranium compounds, Dioxides), (*Radiation damage, Reactor materials).

For abstract, see N 20 15.

ORNL-3943 **Field 18J, 18F, 18I, 7A**
CFSTI Prices: HC$3.00 MF$0.75
Oak Ridge National Lab., Tenn.
ESTIMATION OF FUEL-SHIPPING COSTS FOR NUCLEAR POWER COST-EVALUATION PURPOSES.
by Royes Salmon. Mar 66, 67p
Contract W-7405-eng-26

Descriptors: (*Reactor fuels, Transportation), (*Transportation, Costs).

For abstract, see N 20 15.

AD-635 682 **See Field 11F**

BMI-1766 **See Field 11F**

BNWL-198 **See Field 11B**

BNWL-207 **See Field 11F**

GEMP-400A **See Field 11B**

GEMP-58A **See Field 11B**

ORNL-3831 **See Field 11F**

ORNL-3952 **See Field 7A**

PB-170 653 **See Field 7B**

PB-170 654 **See Field 7C**

UCRL-14805 **See Field 11F**

WAPD-MRP-116 **See Field 18I**

WCAP-3385-51 **See Field 18I**

WCAP-3385-53 **See Field 18I**

WCAP-3385-54 **See Field 18I**

18K. REACTOR PHYSICS

NAA-SR-11821 **Field 18K, 12A**
CFSTI Prices: HC$2.00 MF$0.50
Atomics International, Canoga Park, Calif.
SPACE-TIME FLUX SYNTHESIS METHODS FOR THE APPROXIMATE SOLUTION OF TIME-DEPENDENT BOLTZMANN NEUTRON TRANSPORT EQUATION.
by V. Luco. 25 May 66, 37p
Contract AT (11-1)-GEN-8

Descriptors: (*Approximation (Mathematics), Neutron transport theory), (*Neutron transport theory, Approximation (Mathematics)).

For abstract, see N 20 15.

N66-17663 **Field 18K**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
THERMAL NEUTRON FLUX PERTURBATION BY DYSPROSIUM-ALUMINUM FOILS IN WATER AND URANYL FLUORIDE - WATER SOLUTIONS.
by D. L. Alger, D. Bogart, R. A. Mueller, and D. F. Shook. Mar 66, 18p NASA-TN-D-3237

Descriptors: *Aluminum alloy, *Fluoride, *Thermal neutron, *Uranyl, *Neutron flux, *Radiation measurement.

WASH-1066 **Field 18K, 18I**
CFSTI Prices: HC$3.00 MF$0.50
Division of Reactor Development and Technology (AEC), Washington, D. C. Reactor Physics Branch.
REACTOR PHYSICS EFFORTS REQUIRED IN SUPPORT OF THE FAST BREEDER DEVELOPMENT PROGRAM.
Jan 66, 55p

Descriptors: (*Reactor theory, Breeder reactors), (*Fast reactors, Breeder reactors).

For abstract, see N 20 15.

AD-635 591 **See Field 12A**

DP-1027 **See Field 9B**

WAPD-MRP-116 **See Field 18I**

WCAP-3385-51 **See Field 18I**

18L. REACTORS (POWER)

ORNL-3962 **See Field 7A**

WAPD-MRP-116 **See Field 18I**

WCAP-3385-51 **See Field 18I**

WCAP-3385-53 **See Field 18I**

WCAP-3385-54 **See Field 18I**

18N. SNAP TECHNOLOGY

AD-635 682 **See Field 11F**

19A. AMMUNITION, EXPLOSIVES, AND PYROTECHNICS

AD-636 118 **Field 19A**
CFSTI Prices: HC$1.00 MF$0.50
Naval Ordnance Lab., Corona, Calif.
EXPERIMENTAL METHODS FOR DETERMINING THE EFFECTIVENESS OF INTERRUPTION OF A FUZE EXPLOSIVE TRAIN.
by C. R. Hamilton, W. R. Hoelzen, and R. L. Higuera. 1 Jul 66, 10p NOLC-666

Descriptors: (*Explosive trains, Effectiveness), Fuzes (Ordnance), Tests, Safety, Failure (Mechanics), Arming devices.

Several experimental approaches for establishing the effectiveness of the interruption of an explosive train are presented. It is recommended that a combination of the approaches described be used to evaluate the safety of any new explosive train. (Author)

AD-636 148 **Field 19A, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Frankford Arsenal, Philadelphia, Pa. Propellant Actuated Devices Div.
DEVELOPMENT OF A PENETRATION AND EXTRACTION SYSTEM FOR ORDNANCE DISPOSAL. PHASE I. PENETRATION AND SEAL DEVELOPMENT.
Memorandum rept.
by Bruce W. Travor. May 66, 30p
FA-M66-23-1

Descriptors: (*Ordnance, Samplers), (*Samplers, Cartridges (PAD)), Test equipment, Penetration, Bomb cases, Cartridge cases, Projectile cases, Seals (Stoppers), Disposal, Ammunition.

A feasibility study was conducted on a device to pierce a metal case of ordnance and provide means for extracting a sample of its contents. Basically, the mechanism used to penetrate the metal case wall with a stud needle was a stud-driver gun development by Frankford Arsenal primarily for anchoring studs into concrete block. This report discusses and illustrates the developed steps necessary to adapt the stud driver for use as an Explosive Ordnance Disposal device. A method is presented for sealing the aperture in the bomb which results from needle penetration, and a concept is presented for extracting the filler media. (Author)

AD-636 181 **Field 19A, 21I**
CFSTI Prices: HC$2.00 MF$0.50
Picatinny Arsenal, Dover, N. J.
COMPILATION OF INFRARED SPECTRA OF INGREDIENTS OF PROPELLANTS AND EXPLOSIVES.
by Frank Pristera, and Walter E. Fredericks.Oct 65, 50p

Descriptors: (*Infrared spectroscopy, Explosive materials), (*Explosive materials, Spectra (Infrared)), (*Propellants, Spectra (Infrared)), Amines, Esters, Organic nitrogen compounds, Organic phosphorus compounds, Salts, Ureides.

The spectrograms of over 175 substances, taken between 2 and 15 microns, are reproduced.

AD-636 155 **See Field 16C**

AD-636 165 **See Field 19G**

19D. EXPLOSIONS, BALLISTICS, AND ARMOR

AD-635 933 **Field 19D, 7D, 20D**
CFSTI Prices: HC$2.00 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
REFLECTED SHOCK INITIATION OF A CHEMICAL REACTION.
Memo rept.
by Ralph E. Shear. May 66, 32p BRL-MR-1743
Proj. RDT/E-1P014501A14B

Descriptors: (*Shock waves, *Chemical reactions), (*Detonation waves, Chemical reactions), Difference equations, Gas flow, Reaction kinetics, Thermodynamics.

The Lax finite difference method is used to compute the hydrodynamic flow which results from the initiation of a chemical reaction by a reflected shock wave. The chemical reaction is assumed to be irreversible and of first order; initial conditions are chosen such that negligible reaction occurs behind the incident shock front. (Author)

AD-636 224 **Field 19D, 20K, 11F**
CFSTI Prices: HC$4.00 MF$1.00
MRD Div., General American Transportation Corp., Niles, Ill.
STUDIES IN THE PERFORATION OF THIN METALLIC PLATES BY PROJECTILE IMPACT: I. NORMAL IMPACT OF CIRCULAR CYLINDERS.
Final rept. Feb 65-Apr 65.
by L. E. Fugelso, and F. H. Bloedow. Jun 66, 134p MR-1250
Contract DA-19-129-AMC-247 (N)
Proj. DA-1K024401A113
C/OM9, USA-NLABS-66-58-CM

Descriptors: (*Aluminum alloys, Terminal ballistics), (*Titanium alloys, Terminal ballistics), (*Terminal ballistics, Impact tests), Metal plates, Cylindrical bodies, Steel, Thickness, Fracture (Mechanics), Mathematical prediction.

Identifiers: Aluminum alloy 7075, Titanium alloy 5Al 2.5 Sn.

The ballistic parameters were determined analytically and experimentally for the perforation of aluminum alloy and titanium alloy plates by normal impact of steel cylinders. Analytical predictions of the perforation parameters were prepared on the basis of theoretical models of the perforation process. Experimental determination of the critical perforation and residual velocities discriminated among the various models and further experimentation verified the analytical description of the perforation process. One model of perforation was found which adequately describes the ballistic parameters for the normal impact of steel cylinders into aluminum alloy and titanium alloy plates for impact velocities up to 5000ft/sec and plate thicknesses up to 0.25 inches. (Author)

PB-169 630 **Field 19D, 19H**
CFSTI Price: HC$3.00
Naval Ordnance Test Station, China Lake, Calif.
WATER ENTRY CAVITY MODELING. PART I. VERTICAL CAVITIES.
2 May 57, 53p NAVORD-5365-Pt-1
Proj. 5510.7
AD-128 957

Descriptors: (*Water entry, simulation), (*Cavitation, Water entry), Underwater trajectories, Torpedo trajectories, Torpedoes, Scale.

Modeling studies were conducted with a 2-inch-diameter hemisphere-head missile as a prototype and with 1- and 1/2-inch-diameter models of the prototype. This 'modeling with models' program was carried out to investigate the importance of gas-density scaling in conjunction with Froude and cavitation-number scaling in water-entry cavity modeling. The observation of the cavities formed by the vertical entry of these models showed that one-to-one scaling of the Froude and cavitation numbers and of the gas density coefficient modeled the cavity to a high degree of accuracy. Failure to scale the cavitation number did not prevent good modeling, but when the gas density coefficient was not scaled modeling did not occur. Good water-penetration-distance modeling obtained for all modeling conditions. Evaluation of the importance of atmospheric-density scaling on water-entry modeling must be deferred until tests are extended to include launchings of models at oblique angles. Cavitation-number scaling cannot be disregarded in the general water-entry modeling problem because it has been found necessary to model missile motion in oblique water entry. (Author)

AD-357 501 **See Field 18C**

AD-635 589 **See Field 4B**

AD-635 590 **See Field 4B**

AD-635 768 **See Field 9B**

AD-635 803 **See Field 20A**

19E. FIRE CONTROL AND BOMBING SYSTEMS

AD-636 278 **Field 19E, 1C**
CFSTI Prices: HC$1.00 MF$0.50
Naval Air Test Center, Patuxent River, Md.
FLIGHT EVALUATION OF MODIFIED FOLD-DOWN OPTICAL SIGHT AND PILOTS RADAR SCOPE FILTER FOR F-4 AIRCRAFT.
Interim rept. no. 1, 20 Jan-1 May 66.
by J. N. Fendley. 19 Jul 66, 3p WST-83R-66
RA1300001

Descriptors: (*Optical sights, Tests), (*Optical filters, *Radar equipment), (*Fire control system components, Flight testing), Fighters, Night bombing.

Identifiers: F-4 aircraft, Evaluation.

The fold-down optical sight is unsatisfactory for service use for the following reasons: (a) Lack of an adequate light shutter. (b) Excessive hysteresis error. (c) Inadequate mounting of the slip indicator. The pilots radar scope filter is satisfactory for service use.

AD-636 171 **See Field 15E**

19F. GUNS

AD-475 761 **Field 19F**
CFSTI Prices: HC$4.00 MF$1.50
Aberdeen Proving Ground, Md.
MILITARY POTENTIAL TEST OF 20MM AND 40MM INTERIM AIR DEFENSE WEAPONS SYSTEMS.
Interim rept. no. 1.
2 Aug 65, 318p
Proj. USATECOM-3-5-9240-06/08/10/12/14

Descriptors: (*Antiaircraft guns, Performance (Engineering)), (*Automatic weapons, Antiaircraft guns), Gun sights, Fire control systems, Gun mounts, Gun barrels, Gun turrets, Power, Synchronization (Electronics), Feed mechanisms, Link chutes, Loading, Firing tests (Ordnance), Protective coverings, Self-propelled guns, Armored vehicles, Experimental data, Antiaircraft defense systems, Systems engineering, Optimization, Cyclic rate, Reliability, Tracking, Errors.

A Military Potential Test of four interim forward area defense weapon system candidates was conducted to determine a gun solution winner for early filed issue in limited quantities. The D+PS responsibilities were to investigate certain engineering characteristics of each candidate system and to support applicable data acquisition requirements of the Weapons System Laboratory of BRL, for their evaluation. The 20mm and 40mm guns were tested along with auxiliary equipment. (Author)

N66-13014 Field 19F
CFSTI Prices: HC$7.00 MF$1.50
Advisory Group for Aerospace Research and Development, Paris (France).
THE THEORY OF HIGH SPEED GUNS.
by A. E. Seigel. May 65, 326p
AGARDOGRAPH-91

Descriptors: *Gas gun, *High temperature gas, *Gas dynamics, *Molecular gas, *Weight factor.

For abstract, see T 66 17.

AD-635 553 See Field 11F

19G. ROCKETS

AD-636 103 Field 19G, 20D
CFSTI Prices: HC$4.60 MF$0.50
RAND Corp., Santa Monica, Calif.
WAVE-INDUCED MOTIONS OF A LARGE ROCKET VEHICLE DRIFTING IN A VERTICAL ATTITUDE.
by J. J. Leendertse. 29 Jun 61, 44p P-2365
Prepared for presentation at the Winter Annual Meeting of The American Society of Mechanical Engineers, 25-30 Nov 62, New York.

Descriptors: (*Rocket research, *Hydrodynamics), Motion, Drift, Equations of motion.

Results are presented of a theoretical and experimental laboratory study of the movements of a large solid-propellant rocket vehicle drifting in a vertical attitude in uniform waves and in the wave environment of the open sea. Measurements were made of the movement in heave and pitch of a 1-120 scale model of a 175-ft long vehicle. Experimentally obtained results compared well with those obtained analytically. It appears that heave and pitch are linear functions of the wave height and nonlinear functions of the wave frequency. Pitch and surge are coupled. On basis of the linear response of the vehicle to uniform waves, statistical features of the response in heave and pitch to ocean waves with a particular spectrum are calculated. (Author)

AD-636 165 Field 19G, 21H, 19A, 21B K
CFSTI Prices: HC$1.00 MF$0.50
Naval Missile Center, Point Mugu, Calif.
SPECTRAL MONITORING OF ROCKET FLAMES.
Technical memo.
by E. M. Kane. 21 Jul 66, 17p TM-66-34

Descriptors: (*Exhaust flames, Spectroscopy), (*Spectrum analyzers, Exhaust flames), (*Rockets, Exhaust flames), (*Pyrotechnics, Spectroscopy), Rocket motors, Captive tests, Flares, Monitors, Spectrographic cameras, Design.

Three types of spectrographs suitable for analysis of rocket flames are described, together with typical spectrograms of various rocket and pyrotechnic flames. The usefulness of flame spectra in rocket evaluation is discussed. (Author)

19H. UNDERWATER ORDNANCE

AD-636 176 Field 19H, 20D
CFSTI Prices: HC$5.00 MF$1.00
Western Co. of North America, Dallas, Tex. Research Div.
A STUDY OF THE MIXING OF DRAG REDUCTION POLYMERS.
Final rept.
by G. T. Pruitt, and H. R. Crawford. Oct 64, 173p
Contract N123 (60530)34461A

Descriptors: (*Torpedoes, Drag), (*Polymers, *Lubricants), Reduction, Friction, Fluid flow, Water, Injection, Mixtures, Skin friction, Turbulence.

Drag reductions of up to 79% were demonstrated by injection of high molecular weight water soluble polymers into water. Synthetic polymers were determined to be the most suitable for torpedo drag reduction. Slurries of polymers in non-solvents, at concentrations of about 40 wt.% of the active polymer, can be made, pumped and dispersed in a water stream and give dramatic friction reduction. In addition it is feasible to carry a sufficient amount of this type slurry on board a torpedo. From the time of injection of a slurry of polymer particles in a non-solvent into a flowing stream of water, a drag reduction of 46% has been achieved in 0.08 seconds and 79% drag reduction in approximately 0.34 seconds. It was established that a high degree of turbulence is necessary to disperse and dissolve the polymer sufficiently in the short time available. The feasibility of the use of polymers in solution to reduce the drag on a torpedo was demonstrated.

PB-169 630 See Field 19D

20. PHYSICS

N66-15614 Field 20
CFSTI Prices: HC$2.00 MF$0.50
Southern Methodist Univ., Dallas, Tex.
MULTIDISCIPLINARY RESEARCH IN SPACE-RELATED SCIENCE AND TECHNOLOGY.
Semiannual status rept. 1 May - 1 Nov 65.
by J. C. Denton. 1965, 42p
Grant NGR-44-007-006
NASA-CR-69484

Descriptors: *Electrostatics, *Radiation effect, *Thin film, *Paramagnetic resonance, *Sodium vapor, *Thermoconductivity.

For abstract, see T 66 17.

20A. ACOUSTICS

AD-468 869 Field 20A, 17A
CFSTI Prices: HC$3.00 MF$2.00
Naval Air Development Center, Johnsville, Pa. Air Warfare Research Dept.
LECTURE NOTES ON UNDERWATER ACOUSTICS.
by Charles L. Bartberger. 17 May 65, 434p
NADC-WR-6509

Descriptors: (*Underwater sound, Textbooks), Sonar, Sound transmission, Acoustics, Echo ranging, Electroacoustic transducers, Differential equations, Pressure, Acoustic impedance, Sound ranging, Wave transmission, Attenuation, Reflection, Signal-to-noise ratio, Doppler effect, Propagation, Marine biological noise, Physical properties.

The report consists of a set of lecture notes for a course in underwater acoustics, given at the U. S. Naval Air Development Center. The course is based to a considerable extent upon J. W. Horton's book, 'Fundamentals of Sonar,' and covers the following topics: physical properties of acoustic waves in water, relative magnitudes and transmission loss, propagation, transducers, indicators and recorders, detection of signals, echo-ranging, and a brief discussion of signal processing for active sonars. (Author)

AD-478 109 Field 20A, 8K
CFSTI Prices: HC$3.00 MF$0.75
Lamont Geological Observatory, Palisades, N. Y.
MEASUREMENT OF P AND S SOUND VELOCITIES UNDER PRESSURE ON LABORATORY MODELS OF THE EARTH'S MANTLE.
Final rept., 16 Dec 63-15 Dec 65.
by Orson L. Anderson, and Edward Schreiber.
16 Dec 65, 76p
Contract AF 49 (638)-1355, ARPA orders-292-63
Projs. AF-4810, AF-3810
Task 8652

Descriptors: (*Ultrasonic radiation, Earth models), (*Earth (Planet), Sound transmission), Aluminum compounds, Magnesium compounds, Oxides, Interferometers, Measurement, Pressure, Temperature, Elasticity, Experimental data, Velocity, Simulation, Sound ranging, Acoustic properties, Seismology.

The techniques of ultrasonic interferometry were used to measure the idstropic sound velocities and their derivatives for polycrystalline specimens of aluminum oxide and magnesium oxide. The pressure derivatives were determined to 4 kbars at room temperature and at -78.5C. The temperature derivatives were measured at 1 atm. The isothermal pressure derivatives of the bulk modulus were determined. From these data, the critical temperature gradient for velocities, (dT/dP)v, were evaluated, and the velocity behavior of these materials as a function of temperature and depth in the mantle, are discussed. It was found that, because (dT/dP)vp > (dT/dP)vs, they exhibit a shear velocity minimum and a less pronounced longitudinal velocity minimum under conditions likely to exist in the upper mantle. An expression was derived, employing the measured values of the bulk modulus B (o), which predicts compression at extremely high pressures. (Author)

AD-635 660 Field 20A, 8J, 17A
CFSTI Prices: HC$3.00 MF$0.75
Avco Corp., Lowell, Mass. Avco Space Systems Div.
UNDERWATER ELECTRODELESS SPARK SOUND SOURCE.
Technical rept.
by H. A. Wright. 20 Jul 66, 68p AVSSD-0008-66-CR
Contract Nonr-4389 (00)

Descriptors: (*Underwater sound generators, Sparks), Electric discharges, Underwater, Bubbles, Equations of motion, Instrumentation.

The electrodeless spark principal involves the generation of an underwater electric spark in the orifice of a dielectric barrier which separates two volumes of sea water. Research on impulse sound generation by such a principle is described which shows that the electrodeless spark discharge can be typified as: extremely reproducible; capable of routine generation of peak pressure corresponding to 0.134 db/nb at 1 yard; pulse lengths of 50 microsec; extremely precise time of ignition; suitable for arrayed operation, i.e., no interaction between elements which are electrically paralleled; a potential to suppress, and presumably to essentially eliminate, the secondary collapse or bubble pulse; essentially omnidirectional except in some configurations. The dynamic equations of motion of a spherical bubble are discussed and aspects developed which are pertinent to the electrodeless spark dynamics. Parametric surveys of the electrodeless spark discharge are summarized, and device design and construction described. (Author)

AD-635 767 Field 20A
CFSTI Prices: HC$2.00 MF$0.50
Army Missile Command, Redstone Arsenal, Ala. Physical Sciences Lab.
PROFILE TYPES OF SOUND SPEED IN THE LOWER ATMOSPHERE AND THEIR RELATIONSHIPS TO ACOUSTIC FOCUSING.
by O. Essenwanger. 15 Apr 66, 36p RR-TR-66-6
Contract NASA Order-H61485

Descriptors: (*Sound, *Atmosphere), Propagation, Velocity, Noise.

The derivation of characteristic profiles for the sound speed is discussed and a classification system introduced. The system comprises 32 types of sound profiles with subsequent division into three groups, namely without and with returning rays and with focusing. The idealized 32 proto-

types of the classification system are based on the percentage reduction for orthogonal polynomials and the sound speed profiles are classified by utilization of the maximum relationship with the prototypes. The types show significant relationship with acoustic focusing and display practically no seasonal, azimuthal, or climatic variation for focusing. Therefore, seasonal, azimuthal, and climatic changes are caused by the occurrence of types. These seasonal, climatic, and azimuthal fluctuations of the types are presented. (Author)

AD-635 803 **Field 20A, 17A, 19D**
CFSTI Prices: HC$1.00 MF$0.50
Underwater Systems, Inc., Silver Spring, Md.
CHASE V SOURCE DATA.
Technical progress rept. no. 11.
10 Jun 66, 12p
Contract Nonr-4026 (00), ARPA Order-218
Proj. ONR-RR004-08-01

Descriptors: (*Underwater explosions, *Acoustics), Shock waves, Propagation, Measurement, Oceanology, Underwater sound, Sound transmission.

Identifiers: Chase event.

For abstract, see T 66 17.

AD-636 159 **Field 20A**
CFSTI Prices: HC$2.00 MF$0.50
Avco Corp., Wilmington, Mass. Space Systems Div.
GEOMETRICAL ACOUSTICS' THEORY OF WAVES FROM A POINT SOURCE IN A TEMPERATURE-AND WIND-STRATIFIED ATMOSPHERE.
Interim scientific rept.
by Allan D. Pierce. 2 Aug 66, 38p Scientific-5, AVSSD-0135-66-CR
Contract AF 19 (628)-3891
Proj. AF-7637
Task 763702
AFCRL-66-454

Descriptors: (*Acoustics, *Atmosphere), Sound, propagation, Numerical analysis.

Identifiers: Geometrical acoustics.

This paper is concerned with the propagation of acoustic waves in temperature-and wind-stratified atmospheres in the geometrical acoustics' approximation. The basic theory of Blokhintzev is shown to hold for propagation in the atmosphere, even when gravitational forces and pressure gradients are included, if wave periods are sufficiently short. The 'ray-tracing' equations are derived from the eikonal approximation using Cauchy's method of characteristics, and the boundary conditions on these equations appropriate to a point source are discussed. Previous approximate methods of integrating the ray-tracing equations with the neglect of cross-winds are discussed, and a formulation due to Lee is corrected. A numerical method is introduced which alloys cross-winds to be taken into account. An extension of this method, to include earth curvature effects, is also included. (Author)

AD-636 168 **Field 20A, 17A, 8J**
CFSTI Prices: HC$3.00 MF$0.75
Avco Corp., Lowell, Mass. Avco Space Systems Div.
UNDERWATER ELECTRODELESS SPARK SOUND SOURCE.
Annual technical rept.
by Hubert A. Wright Jr. 20 Jul 66, 69p AVSSD-0008-66-CR-Rev-A
Contract Nonr-4389 (00)
A revised edition of AD-635 660.

Descriptors: (*Underwater sound generators, Sparks), Orifices, Dielectrics, Separation, Ignition, Bubbles, Design, Electric discharges.

The electrodeless spark principle involves the generation of an underwater electric spark in the orifice of a dielectric barrier which separates two volumes of sea water. Research on impulse sound generation by such a principle is described which shows that the electrodeless spark discharge can be typified as: (1) Extremely reproducible (2) Capable of routine generation of peak pressures corresponding to 134 db/micro b at 1 yard (3) Pulse lengths of 50 microsec (4) Extremely precise time of ignition (5) Suitable for arrayed operation, i.e. no interaction between elements which are electrically paralleled. (6) A potential to suppress, and presumably to essentially eliminate, the secondary collapse, or bubble pulse (7) Essentially omnidirectional except in some configuration. The dynamic equations of motion of a spherical bubble are discussed and aspects developed which are pertinent to the electrodeless spark dynamics. Parametric surveys of the electrodeless spark discharge are summarized, and device design and construction are described. (Author)

N66-14689 **Field 20A, 20D**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautical Lab., Bangalore (India).
ACOUSTIC OSCILLATIONS IN NON-ADIABATIC FLOW SYSTEMS.
by S. N. B. Murthy. Jun 65, 95p TN-PR-1-65

Descriptors: *Acoustic excitation, *Flow field, *Oscillation, *Nonadiabatic theory.

For abstract, see T 66 17.

AD-474 719 **See Field 13M**

AD-635 633 **See Field 6P**

AD-635 668 **See Field 17A**

AD-635 808 **See Field 20K**

AD-636 090 **See Field 20E**

AD-636 142 **See Field 17H**

AD-636 178 **See Field 13J**

AD-636 179 **See Field 9A**

20B. CRYSTALLOGRAPHY

AD-428 016 **Field 20B, 17E**
CFSTI Price: HC$6.00
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
TELLURIUM CRYSTAL GROWTH.
by R. C. Keezer. Dec 63, 31p Rept. no. 2900-435-R
Contract DA-36-039-sc-78801
Proj. 3D5801001
Report on Project Michigan.

Descriptors: (*Tellurium, Crystal growth), (*Crystal growth, Tellurium), (*Infrared optical materials, Tellurium), Single crystals, Preparation, Crystal structure, Infrared detectors, Great Britain.

Techniques employed for the preparation of single crystal tellurium by the slow-cooling, vapor, Bridgman, and Czochralski methods are described; the last method is emphasized. The Czochralski method has provided large (17 mm diameter by 70 mm long) single crystal boules, and lends itself to the addition of dopants during crystal growth. The ready cleavage parallel to the c axis evidenced by tellurium crystals requires the use of special techniques for fabrication of samples for optical and electrical evaluation. (Author)

AD-635 873 **Field 20B**
CFSTI Prices: HC$1.00 MF$0.50
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
THE GROWTH OF SINGLE-CRYSTAL CALCIUM TARTRATE TETRAHYDRATE BY CONTROLLED DIFFUSION IN SILICA GEL.
Physical sciences research papers.
by Mary A. DiPietro, John J. O'Connor, and Bernard Rubin. May 66, 20p AFCRL-PSRP-227, AFCRL-66-321
Proj. AF-5620
562005

Descriptors: (*Tartrates, *Crystal growth), (*Calcium compounds, Crystal growth), Single crystals, Hydrates, Silicon compounds, Dioxides, Gels, Diffusion, pH, Concentration (Chemistry), Crystal structure.

Identifiers: Calcium tartrate, Silica gel.

Single crystals of calcium tartrate tetrahydrate ($CaC_4H_4O_6.4H_2O$) were grown by controlled diffusion in silica gel. The crystals attain a size of up to 6 x 11 mm in about four to five weeks, and take on a form which, to all outward appearances, seems to have been cut and polished. Conditions for the optimum growth of the crystals are given and it is shown how the pH of the gel, the temperature of its formation, the concentration of the reactants which make up the gel, and the concentration of the reactants which result in the crystal are important in attaining good single crystal products. (Author)

AD-635 920 **Field 20B, 20E, 20L**
CFSTI Prices: HC$3.00 MF$0.75
Linde Div., Union Carbide Corp., Indianapolis, Ind.
CZOCHRALSKI GROWTH OF $LaAlO_3$.
Final rept. 1 Jan-31 Jul 66.
by C. D. Brandle. 29 Jul 66, 68p SRCR-66-12
Contract Nonr-4793 (00) (A-1), ARPA Order-306
See also AD-627 149.

Descriptors: (*Crystal growth, Lanthanum compounds), (*Lanthanum compounds, Aluminates), (*Lasers, Lanthanum compounds), Crystals, Doping, Rare earth elements, Twinning (Crystallography), Crystal lattice defects, Color centers, Chromium, Neodymium compounds, Holmium compounds, Ytterbium compounds, Rods, Optical properties, Annealing.

Identifiers: Czochralski growth, Lanthanum aluminate.

Crystals containing rare earth dopants (Nd, Ho, Yb) as well as Cr have been successfully grown. Several problems such as bubble formation and dopant variation were encountered; however, these have been reduced by adjusting the growth parameters. Rods have been fabricated which were detwinned to a sufficient state to allow laser testing. Initial testing has begun on Nd doped $LaAlO_3$ which has been successfully lased. (Author)

AD-635 945 **Field 20B**
CFSTI Prices: HC$2.00 MF$0.50
Bausch and Lomb, Inc., Rochester, N. Y.
STUDY OF NON-OXIDE MATERIALS WITH DEFECT STRUCTURES.
Final summary rept.
by P. C. Velasquez, and H. C. Hafner. 31 Dec 64, 46p
Contract Nonr-3632 (00), ARPA order-269
Proj. NR-015-501
Prepared in cooperation with Pennsylvania State Univ., University Park. Materials Research Lab.
See also AD-615 609.

Descriptors: (*Fluorides, *Crystal lattice defects), Crystal structure, Potassium compounds, Manganese compounds, Scandium compounds, Lanthanum compounds, Strontium compounds, Density, Refractive index, Hardness, Resistance (Electrical), Light transmission, Physical properties, Hot working, Solid solutions.

Identifiers: Compacts.

Several ionic fluoride systems, demonstrating the feasibility of preparing materials with controllable defects up to 20 mole %, have been investigated. Methods of preparation are described. The materials were characterized with respect to type of defect present and its influence on the properties of the host structure. A significant new contribution to the literature was the discovery of extensive defect concentration in the tysonite structure and establishment of the defect model as predominantly anion vacancies. Hot-pressed specimens exhibit ionic conduction considerably greater than the non-defect tysonite and other hot-pressed fluorides. A tetragonal phase, heretofore unreported, was found in the system KMgF3-ScF3. Major problems encountered were oxidation and accomplishing homogeneity in the solid solutions. Polycrystalline compacts of these materials were fabricated using hot-pressing apparatus and techniques developed for this purpose. Observed alteration of the refractive index, unit cell size, and density of a material related to a change in type and concentration of defect, and successful compaction of polycrystalline aggregates, demonstrates the feasibility of predicting and tailor-making materials having desired properties. (Author)

BNL-952 **Field 20B, 20L**
CFSTI Prices: HC$1.00 MF$0.50
Brookhaven National Lab., Upton, N. Y.
DEFECTS IN CRYSTALS.
Brookhaven lecture series no. 51.
by G. J. Dienes. 17 Nov 65, 11p
Contract AT (30-2)-GEN-16

Descriptors: (*Crystal lattice defects, Theory).

For abstract, see N 20 15.

N66-15082 **Field 20B**
CFSTI Prices: HC$1.00 MF$0.50
Atomic Energy Comission Research Establishment, Riso (Denmark).
ON THE DETERMINATION OF INTERATOMIC POTENTIALS IN METALS BY ELECTRON IRRADIATION EXPERIMENTS.
by H. H. Anderson, and P. Sigmund. May 65, 24p RISO-103

Descriptors: *Crystal structure, *Irradiation, *Potential problem.

PB-170 648 **Field 20B, 11F, 20L**
CFSTI Prices: HC$6.00 MF$0.75
Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
ETUDE AU MOYEN DE LA RESISTIVITE ELECTRIQUE DES DEFAUTS PONCTUELS DANS LE FER PUR (Study of Point Defects in Pure Iron by Means of Electrical Resistivity).
Doctorial thesis in French.
by Colette Minier-Cassayre. 6 Apr 65, 73p CEA-R-2905
Text in French; Attached Summary in English.

Descriptors: (*Iron, *Crystal lattice defects), France, Impurities, Annealing, Heat of activation, Resistance (Electrical).

In the first part of this work, after having reviewed the production, observation and the annealing of point defects in metals, the present state of research is resumed. In the second part, the techniques employed to produce point defects at low temperatures are explained: irradiation, quenching and cold-work; the study of their migration and annealing is studied. The experimental results obtained for pure iron and for iron containing certain impurities are presented in the third part. The fourth part suggests a model which explains the different stages of annealing observed, and their properties. The energies of interaction between point defects with the values deduced from the theory of elasticity are then compared. (Author)

AD-635 579 **See Field 7D**

AD-635 587 **See Field 11B**

AD-635 653 **See Field 20L**

AD-635 694 **See Field 11B**

AD-635 829 **See Field 11F**

AD-636 054 **See Field 7B**

20C. ELECTRICITY AND MAGNETISM

AD-635 605 **Field 20C, 9A, 20L**
CFSTI Prices: HC$1.00 MF$0.50
Controls for Radiation, Inc., Cambridge, Mass.
CRITERIA FOR RADIATION INSENSITIVE INSULATORS.
by Sumner Mayburg. Mar 66, 13p Scientific-3
Contract AF 19 (628)-5214
Proj. AF-5620
Task 562002
AFCRL-66-273

Descriptors: (*Photoconductivity, *Electric insulation), (*Electromagnetic shielding, *Photoelectric effect), Gallium alloys, Arsenic alloys, Sensitivity, Transients, Circuits, Solid state physics.

A review of the accepted theory of radiation induced conductivity in insulators is presented. The recovery from a radiation pulse is analyzed in some detail and it is shown that in high resistivity materials the recovery time is limited by the normal conductivity of the insulator. Radiation insensitive insulators for use with solid state circuits should have resistivity in the range 1,000,000 - 10,000,000 ohms - cm, short carrier lifetime, and a minimum of trapping. In addition, ohmic contacts to the insulator to allow return of electrons driven off by the radiation must be made relatively easily. Semi-insulating gallium arsenide is suggested as a material fulfilling these criteria. (Author)

AD-636 095 **Field 20C, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
MAGNETIC FIELD DESIGN WITH AN ELECTROLYTIC TANK ANALOG.
Instrumentation papers.
by Lewis S. Combes, Charles C. Gallagher, and Morton Levine. May 66, 20p AFCRL-IP-98, AFCRL-66-328
Proj. AF-8608
Task 860802

Descriptors: (*Magnetic fields, Simulation), Magnet coils, Experimental design, Plasma physics, Electrolytes, Tanks (Containers), Analog systems, Magnetism.

A simplified electrolytic tank has been constructed that serves as a relatively easy and reasonably accurate analog method of designing a magnetic field configuration to be used in a plasma containment device. The current density in the electrolyte is directly proportional to the magnetic flux density in the coils and equations have been derived from this relationship by which flux density, magnetomotive force, inductance, total flux, and energy in the coils can be found from tank measurements. The detailed analysis of a specific magnetic field problem is given. (Author)

N66-15397 **Field 20C**
CFSTI Prices: HC$1.00 MF$0.50
Michigan Univ., Ann Arbor. Radiation Lab.
DEFINITE AND INDEFINITE FORMS OF MAXWELL'S EQUATIONS FOR MOVING MEDIA.
by Chen-To Tai. 1965, 17p
Grant NGR-23-005-107
NASA-CR-69346

Descriptors: *Electrodynamics, *Relativity theory, *Maxwell equation.

For abstract, see T 66 17.

N66-15439 **Field 20C**
CFSTI Prices: HC$1.00 MF$0.50
Michigan Univ., Ann Arbor. Radiation Lab.
ELECTRODYNAMICS OF MOVING MEDIA.
Semiannual rept. no. 1, 1 May-1 Nov 65.
by R. M. Kalafus, V. Pyati, and C. T. Tai. 1 Nov 65, 20p Rept. no. 7322-1-T
Grant NGR-23-005-107
NASA-CR-69388

Descriptors: *Electrodynamics, *Minkowski theory, *Oscillating flow, *Cerenkov radiation.

N66-18167 **Field 20C**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
MAGNETIC BREAKDOWN IN A FINITE ONE-DIMENSIONAL MODEL-INFINITE POTENTIAL RELAXED.
by G. Allen. Mar 66, 29p NASA-TN-D-3224

Descriptors: *Electron state, *Field theory, *Magnetic field, *Mathematical model, *Quantum mechanics.

AD-635 813 **See Field 20L**

AD-636 050 **See Field 4A**

AD-636 090 **See Field 20E**

AD-636 160 **See Field 20I**

AD-636 257 **See Field 20L**

AD-636 267 **See Field 9A**

20D. FLUID MECHANICS

AD-416 545 **Field 20D**
CFSTI Prices: HC$4.00
Brown Univ., Providence, R. I. Div. of Engineering.
FAR-FLOW APPROXIMATIONS FOR PRECURSOR IONIZATION PROFILES.
by Lewis Wetzel. Jun 63, 35p
Contract Nonr (562)-35
Prepared for presentation at AIAA Conference on Physics of Entry into Planetary Atmospheres, Massachusetts Inst. of Tech., 26-28 Aug 1963.

Descriptors: (*Gas ionization, Wake), (*Shock waves, Gas ionization), Mathematical analysis, Energy, Transport properties, Approximation (Mathematics), Mathematical models, Photochemistry, Space charges, Diffusion.

Two far-flow models are examined to account for the presence of precursor ionization ahead of a hypersonic shock front. These models are based, respectively, on photoionization of the upstream gas by shock radiation, and the diffusion of charges from the actively ionized region. Neither model involves the active shock directly, so their implications are useful mainly in estimating the shape of precursor ionization profiles. Emphasis is given to those profiles produced by shock radiation in gases whose photon absorption cross sections are decreasing functions of energy above the ionization edge. Dramatic departures from simple exponential decay are found for gases like helium, atomic hydrogen and, to a lesser extent, argon, and molecular hydrogen and nitrogen. Moreover, the average energy of the photo-electrons rises significantly as one moves upstream. The diffusion model reduces, in the far-flow limit, to exponential decay governed by the free electron diffusion length, regardless of the nature of the space-charge fields, although these fields might produce space-

charge limited diffusion. Finally, the role of the onset region of a real shock is discussed as it affects the interpretation of these models. (Author)

AD-470 737 Field 20D, 10B, 20I
CFSTI Prices: HC$1.50 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
A REVIEW OF FLUID MECHANICAL PROBLEMS IN MHD GENERATORS.
Technical rept.
by E. G. Broadbent. May 65, 50p TR-65108

Descriptors: (*Magnetohydrodynamic generators, Fluid dynamic properties), Hall effect, Gas flow, Boundary layer, Velocity, Flow separation, Stability, Reviews, Great Britain.

The basic equations of channel flow through an MHD generator are introduced using matrix conductivity for Hall effects. Gas dynamics is briefly considered from the point of view of possible irregularities in the flow. A review is given of published work on boundary layers, velocity profiles and boundary layer separation, with a brief mention of flow instabilities. Possible lines of research are discussed. (Author)

AD-477 148 Field 20D
CFSTI Price: HC$3.00
Aeronautical Research Associates of Princeton, Inc., N. J.
EXPERIMENTS ON THE OBLIQUE IMPINGEMENT OF UNDEREXPANDED JETS ON A FLAT PLATE.
Technical rept.
by Richard S. Snedeker, and Coleman duP. Donaldson. Apr 65, 115p ARAP-64
Contract Nonr-3903 (00) (X), ARPA Order-149-60
NRL-MR-1687

Descriptors: (*Jets, Fluid dynamic properties), Flat plate models, Reentry vehicles, Pressure, Distribution, Heat transfer, Flow fields, Stagnation point.

Identifiers: Jet impingement.

An experimental investigation was made of the general behavior of an air jet impinging obliquely on a circular flat plate. Surface pressure distributions and velocity profiles of the resulting wall jet were measured. Typical stagnation point radial velocity gradients, their dependence on impingement angle, and their correlation with local free jet properties were also determined. Throughout the range of impingement angles studied the wall jet thickness was found to be relatively constant around the plate perimeter. The azimuthal variation of momentum flux per radian depended strongly on impingement angle and only slightly on jet strength and impingement distance. (Author)

AD-635 570 Field 20D, 12A
CFSTI Prices: HC$2.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Fluid Mechanics Lab.
THEORY OF THE LINEAR FOKKER-PLANCK COLLISION OPERATOR.
by C. H. Su. May 66, 28p Pub-66-4
Contract Nonr-1841 (93)

Descriptors: (*Operators (Mathematics), Theory), (*Molecular beams, Potential theory), Integrals, Distribution functions.

Identifiers: Fokker-Planck equation.

The linearized Fokker-Planck Collision integral with coulomb interaction is expanded in terms of surface spherical harmonics. The radial part of the distribution function is shown to be governed by a set of decoupled differential-integral equations. The differential operators are shown to be self-adjoint while the integral operators are symmetry and completely continuous. The spectrum of the eigenvalues contains, on top of discrete points, a continuous part ranging from zero to minus infinity. The discrete part of the spectrum is obtained by requiring that the corresponding eigenvectors have a definite asymptotic behavior at large velocity. A variation principle is constructed for the computation of the discrete spectrum. (Author)

AD-635 582 Field 20D, 17A
CFSTI Prices: HC$3.00 MF$0.50
IIT Research Inst., Chicago, Ill.
TURBULENT FLOW TRANSITION NEAR SOLID AND FLEXIBLE BOUNDARIES.
Final technical rept.
by Henry B. Karplus. Feb 66, 56p IITRI-M-6110
Contract Nonr-3682 (00)
Proj. S-R-009-01-01

Descriptors: (*Turbulence, *Boundary layer transition), Flexible structures, Anemometers, Band spectrum, Walls, Fluid flow, Sonar domes, Signal-to-noise ratio.

Transition to turbulent flow was studied in a channel in which the walls could be interchanged so that both solid and flexible walls could be investigated. The flow fluctuations were measured with a hot film anemometer. Intermittency of the fluctuations was used as a criterion of the transition condition. Turbulence spectra were measured in the transition region and in the region where continuous turbulence had been established near the walls of the channel but did not extend all the way across. Turbulence spectra fall on a uniform curve when the relative band level was plotted against Strouhal number. Band spectrum levels rise from very low Strouhal numbers and fall approximately as S to the -2.5th power for high Strouhal numbers. The intermittency is a useful factor for describing flow transition. The intermittency factor increases fairly rapidly near the wall at a distance from the channel entrance governed by the flow velocity and the wall compliance. The intermittency factor increases as the wall is approached until the sublayer is reached. Flow fluctuations are amplified near walls. Solid walls produce the largest amplification. When amplitudes increase beyond a finite limit, random fluctuation characteristics of turbulence are encountered. (Author)

AD-635 654 Field 20D, 12A
CFSTI Prices: HC$6.00 MF$1.25
Mississippi State Univ., State College. Dept. of Aerophysics.
STATISTICAL THEORY OF TURBULENCE.
Research rept.
by Yutaka Shigemitsu. Jun 66, 251p Aerophysics RR-64
Contract DA-44-177-AMC-892 (T)
Task 1P125901A14203
USAAVLABS-TR-66-25

Descriptors: (*Turbulence, *Statistical mechanics), Equations of motion, Fluid mechanics, Theory, Turbulent boundary layer.

The purpose of this report is to discuss the system of a statistical theory of turbulence in general cases from isotropic turbulence to turbulent boundary layer. In the first three chapters, mathematical formulations are given to the Euler correlation or the Reynolds stress, according to a basic physical picture of vortex chaos motion in which many kinds of vortices are carried along the flow in agitating situations When the formula is combined with the Reynolds equations, quantitative discussions are developed by dividing the cases into two fundamental groups of wake or jet flow in Chapters Four through Seven and of boundary layer or pipe flow in Chapters Eight and Nine. (Author)

AD-635 706 Field 20D
CFSTI Prices: HC$4.00 MF$0.75
Michigan Univ., Ann Arbor.
INFLUENCE OF FLOW AND ROTATIONAL OSCILLATIONS ON THE MECHANICS OF TWO-DIMENSIONAL LAMINAR BOUNDARY-LAYER FLOW PAST CYLINDERS, INCLUDING UNIFORM SUCTION OR BLOWING.
Final rept.
by Wen-Jei Yang, and John A. Clark. Jan 66, 103p
Contract AF 33 (657)-8368
Proj. AF-7063
ARL-66-0010-Pt-5

Descriptors: (*Laminar flow, *Cylindrical bodies), Oscillation, Laminar boundary layer, Two-dimensional flow, Numerical analysis, Theory.

A theoretical investigation of the influence of flow oscillation, fluctuating circulation and rotational oscillation upon the transfer of momentum, heat and mass in two-dimensional laminar boundary-layer flow past cylinders with or without uniform suction. The boundary-layer equations for flow, temperature and concentration are linearized by means of a perturbation procedure and the first three terms retained. The solutions of the velocity, temperature and concentration components are obtained in the forms of an ordinary Blasius series for a symmetrical blunt body and a generalized Blasius series for a sharp-edged body. Theoretical results include the frequency response of fluid velocity, temperature and concentration, the streamline patterns of the streaming, the distribution of the steady second-order temperature and concentration, and the alternations in the shear stress, rates of heat and mass transfer. For flow around a circular cylinder numerical results show that the permanent alterations in the skin friction and heat transfer rate induced by the flow oscillation, fluctuating circulation and rotational oscillation are very small in the range of small amplitude and low frequency. (Author)

AD-635 734 Field 20D
CFSTI Prices: HC$1.00 MF$0.50
Redstone Scientific Information Center, Redstone Arsenal, Ala.
SOME PECULIARITIES IN THE DESIGN OF A NONEQUILIBRIUM TWO-STEP NOZZLE.
by V. A. Bashkatov, and A. A. Tsvetkova. 10 May 66, 14p RSIC-545
TT-66-61787
Trans. of Akademiya Nauk SSSR, Sibirskoe Otdelenie, Izvestiya, n6, Seriya Tekhnicheskikh Nauk n2 p88-93 1965.

Descriptors: (*Nozzle gas flow, Dynamics), (*Nozzles, Design), Mathematical analysis, USSR, Thermal conductivity.

Discussion of the acceleration of droplets in a gas flow, in the case in which the temperature and velocity of the droplets and the gas differ widely. A solution of the problem is obtained by taking the thermal and mechanical interaction between the droplets and the gas into account and using an equation for the droplet dynamics in the form of an empirical quadratic law with allowance for a pressure gradient. (Author)

AD-635 927 Field 20D
CFSTI Prices: HC$2.00 MF$0.50
California Univ., Berkeley. Coll. of Engineering.
MEASUREMENTS OF PRESSURES ON A HEAVING PROLATE SPHEROID.
Technical rept.
by Choung Mook Lee, and John R. Paulling. Mar 66, 44p Rept. no. NA-66-4
Contract Nonr-222 (93)

Descriptors: (*Hydrodynamics, Hydrodynamic configurations), (*Pressure, *Hydrodynamic configurations), Ellipsoids, Experimental data, Three-dimensional flow.

Identifiers: Seaworthiness.

The damping and added mass coefficients for a shiplike form oscillating at a free surface are usually approximated by a 'strip calculation' in which two-dimensional values for shapes similar to sections of the body are summed over the length. For the three-dimensional body the real section values

differ from the local values used in this procedure because of the three-dimensional nature of the real flow caused by body geometry and forward speed. This report presents experimental results which show the magnitude of the three-dimensional effect for a prolate spheroid undergoing forced heaving oscillations while moving longitudinally in calm water. Local hydrodynamic forces on a spheroid model were measured by a number of flush pressure gauges distributed around the girth of the model at several sections. The sectional added mass and damping were than obtained by resolving the integral of pressure at each section into in phase and quadrature components. Total constraint forces were measured and checked against the longitudinally integrated pressure forces. Results were compared with strip computations using two-dimensional cylinder data. In general, the greatest discrepancies were found at the ends of the model. At amidships, measured values agreed quite closely with two-dimensional results. At high frequencies, forward speed was found to have small effect on added mass. However, at high frequencies and high forward speed, negative damping was found at some sections. (Author)

AD-635 971 **Field 20D, 20M**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
THE HYPERSONIC VISCOUS SHOCK LAYER WITH MASS TRANSFER.
by S. Y. Chen, J. Aroesty, and R. Mobley. May 66, 42p RM-4631-PR
Contract AF 49 (638)-1700

Descriptors: (*Shock waves, Mass transfer), (*Hypersonic flow, Shock waves), Viscosity, Blunt bodies, Injection, Air, Skin friction, Boundary layer, Reynolds number, Density.

An investigation of the effects of surface mass transfer on the viscous hypersonic shock layer of a blunt body was performed. Cheng's theory of the Newtonian shock layer was modified to include both suction and injection, and extensive numerical results were obtained for the injection of air into air. These results indicate that the heat-transfer and skin-friction reductions due to injection can be adequately represented by the standard boundary-layer correlation formula for all but extreme low-density flows. As the Reynolds number decreases, however, mass transfer becomes ineffective in reducing heating rates and skin friction, especially for a very cold wall. The effect of nonzero wall temperature is to increase the shock-layer thickness dramatically, and there are also indications that the wall-temperature level determines whether the asymptotic inviscid-shock-layer thickness is approached from above or below. (Author)

AD-636 102 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Naval Weapons Lab., Dahlgren, Va.
ROTATING FLOWS OVER A ROTATING DISK FOR A CLASS OF NON-NEWTONIAN FLUIDS.
Technical rept.
by Hans J. Lugt, and Ernst W. Schwiderski. May 66, 28p Rept. no. 2037
Task R360FR103/2101/R0110101

Descriptors: (*Vortices, *Fluids), Disks, Reynolds number, Laminar flow, Axially symmetric flow, Stability, Boundary layer, Stagnation point, Wake, Flow separation.

Identifiers: Non-Newtonian fluids.

Axisymmetric rotating flows over a rotating disk for Non-Newtonian fluids of Reiner-Rivlin type are calculated by means of an adjustable local boundary layer approximation. Variation of the dynamic similarity parameter, which characterizes the Non-Newtonian fluid, shows that secondary motions of stagnation, wake or cell type can exist. The beginning of instability in Bodewadt type motions, which indicates laminar flow separation from the surface of the disk, is shifted to higher Reynolds numbers for Non-Newtonian fluids. Furthermore, the largest tangential shear stress at the surface is exhibited by laminar flows of Newtonian fluids. (Author)

AD-636 111 **Field 20D, 21B, 21E**
CFSTI Prices: HC$1.60 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
THE EFFECTS OF COMBUSTION IN A RAMJET ON THE PERFORMANCE OF A SUPERSONIC DIFFUSER.
by E. S. Franklin. Dec 48, 19p Bumblebee-93
Contract NOrd-7386

Descriptors: (*Supersonic diffusers, Performance (Engineering)), (*Combustion, *Ramjet engines), Design, Jets, Gas flow, Pressure.

Identifiers: Bumblebee project.

Experimental data are presented for 6-inch ramjet tests employing a normal shock diffuser, with and without combustion. Tests were made with the diffuser intake in both M = 1.59 and M = 1.90 free jet streams. Additional data were obtained from flight tests in the Mach number range of 1.4 to 2.0 at both sea level and altitude. High-frequency, diffuser-exit, pressure-fluctuation data are included for tests of an 18-inch ramjet in a M = 1.90 free jet stream. It is concluded that cold flow simulated combustion tests can provide a sufficient background for the design of supersonic diffusers for ramjet applications and that unidimensional theory, at least for the particular diffuser geometry described in the report, is adequate for the description of internal flow. It is suggested that failures to correlate diffuser performance in cold flow tests with that during combustion is due to malfunction of the combustor which can be avoided by proper design. (Author)

AD-636 115 **Field 20D**
CFSTI Prices: HC$2.60 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
THE THEORY AND PRACTICE OF TWO-DIMENSIONAL SUPERSONIC PRESSURE CALCULATIONS.
by N. Edmonson, F. D. Murnaghan, and R. M. Snow. Dec 45, 24p Bumblebee-26
Research supported in part by Bureau of Naval Weapons, Washington, D. C.

Descriptors: (*Supersonic flow, *Pressure), Theory, Mathematical analysis, Two-dimensional flow.

For abstract, see T 66 17.

AD-636 158 **Field 20D**
CFSTI Prices: HC$1.00 MF$0.50
Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Mechanics.
DRAG REDUCTION CAUSED BY HIGH POLYMER SOLUTIONS INJECTED INTO WATER FLOWING AROUND CYLINDRICAL BODIES.
by C. N. Baronet, and W. H. Hoppmann II. Jul 66, 26p
Contract Nonr-591 (20)

Descriptors: (*Cylindrical bodies, Drag), (*Polymers, *Lubricants), (*Drag, Reduction), Fluid flow, Concentration (Chemistry), Pipes, Additives, Torque, Injection, Solutions, Water.

Identifiers: Toms' effect.

It was clearly demonstrated that high polymer solutions of a few parts per million by weight substantially reduce the drag on cylindrical bodies, with spherical ends, which are suspended in water flowing in a pipe. The finding is similar to that obtained by investigators for the reduction of resistance to flow of liquids in pipes alone. It is demonstrated that the water tunnel, the measuring equipment, and the method of study are extremely convenient and effective for studying the important phenomena associated with drag reduction caused by dilute solutions of high polymers. (Author)

AD-636 167 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Mechanical Technology, Inc., Latham, N. Y.
THE DYNAMIC RESPONSE OF PERIODICALLY DEFORMED NON-NEWTONIAN FLUID FILMS.
Technical rept.
by C. Wachmann, D. E. Dougherty, and C. H. T. Pan. May 66, 35p MTI-66TR8
Contract Nonr-3731 (00)
Proj. NR-062-290

Descriptors: (*Fluids, *Films), Viscoelasticity, Pressure, Deformation.

Analysis has shown that a time average super-or subambient pressure is generated in a plane parallel squeeze film of a Maxwell fluid with shear dependent viscosity when subjected to skew periodic transverse deformation. The flow behavior index of the fluid, which indicates the deviation from the Newtonian regime, and the ratio of the period of the compression stroke to the total period determine whether the net pressure is superambient or subambient. Fluid consistency, and plate geometry and stroke affect the magnitude of the pressure values. The elastic properties of the fluid enter only into transient response terms and do not contribute to the net pressure. These effects are not obtained for Newtonian fluids or if the deformation is symmetric. Examples are given. (Author)

AD-636 252 **Field 20D, 12A**
CFSTI Prices: HC$4.00 MF$1.00
Michigan Univ., Ann Arbor.
A FINITE DIFFERENCE METHOD FOR COMPUTING UNSTEADY, INCOMPRESSIBLE, LAMINAR BOUNDARY-LAYER FLOWS.
Final scientific rept.
by Charles Luh-Sun Farn, Vedat S. Arpaci, and John A. Clark. Jan 66, 133p
Contract AF 33 (657)-8368
Proj. AF-7063
ARL-66-0010-Pt-3

Descriptors: (*Laminar boundary layer, *Incompressible flow), Laminar flow, Heat transfer, Difference equations, Numerical methods +procedures.

A finite difference method for computing velocity and temperature profiles of an unsteady, incompressible, laminar boundary layer around a two-dimensional cylinder of arbitrary cross section is developed. Blowing or suction may be present on the wall of the cylinder. The thermal boundary condition at the wall may be either specified wall temperature or specified heat flux at the wall. The governing finite difference equations are explicit, the velocity and the temperature at the next time step can be directly computed in terms of those at the current time step. Various errors associated with the finite difference method are studied. Great effort has been made to derive the stability and convergence conditions of the method. The upper bound of the local rounding errors is estimated. Two examples, one oscillation in Blasius flow and the other impulsive start of wedge flow, are given; the numerical results are compared with the existing analytical and experimental results. It is concluded that the present method can be used for the aforementioned computation with high accuracy except at and near a singular point where the singular errors become significant. (Author)

AD-636 253 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Michigan Univ., Ann Arbor. Gas Dynamics Labs.
AN AXISYMMETRIC SIMILARITY SOLUTION FOR VISCOUS TRANSONIC NOZZLE FLOW.
Technical rept.
by M. Sichel, and Y. K. Yin. Jul 66, 31p Rept nos. 07146-1-T, 3537.2-E
Contract DA-31-124-ARO (D)-276
Proj. ORA-07146
AROD-3537:2

Descriptors: (*Transonic nozzles, *Nozzle gas flow), Viscosity, Shock waves.

An axisymmetric viscous-transonic equation is presented. A nozzle type similarity solution of this equation has been found, which describes the initial stages in the development of shock-waves downstream of a converging-diverging nozzle throat. This solution is an extension of a two dimensional solution found previously (Sichel 1966). By an appropriate choice of an arbitrary scaling constant solutions were found such that there is essentially a weak normal shock near the axis with effects of wall and shock wave curvature occurring only at a sufficiently large radius. The upstream and downstream asymptotic behavior of these viscous-transonic nozzle solutions has been investigated. (Author)

N66-11634 **Field 20D, 20I**
CFSTI Prices: HC$2.00 MF$0.50
Advisory Group for Aerospace Research and Development, Paris (France).
DISCUSSIONS FOLLOWING THE PRESENTATIONS OF PAPERS AT THE AGARD FLUID DYNAMICS SPECIALISTS (MEETING) ARC HEATERS AND MHD ACCELERATIONS FOR AERODYNAMIC PURPOSES.
by A. Benoit. Sep 64, 36p AGARD-499, AGARDOGRAPH-84
Presented at Conf. held at Von Karman Inst. for Fluid Dyn., Belgium, Sep 21-23, 1964.

Descriptors: *Accelerator, *Conference, *Aerodynamics, *Arc heating, *Fluid mechanics, *Magnetohydrodynamic acceleration.

For abstract, see T 66 17.

N66-14631 **Field 20D**
CFSTI Prices: HC$5.00 MF$1.00
Fluidyne Engineering Corp., Minneapolis, Minn.
FLOW INITIATION STUDY FOR PROPOSED TUBE WIND TUNNEL. PHASE I. PRELIMINARY EVALUATION OF CANDIDATE SYSTEMS.
by J. L. Grunnet, W. B. Hamre, P. B. Hasselquist, D. N. Kamis, and G. H. Thornberg. Oct 65, 172p
Contract NAS8-20214
NASA-CR-69089

Descriptors: *Diaphragm, *Reynolds number, *Valve, *Wind tunnel.

N66-15641 **Field 20D**
CFSTI Prices: HC$4.00 MF$0.75
National Aeronautics and Space Administration, Huntsville, Ala. George C. Marshall Space Flight Center.
LIQUID BEHAVIOR IN THE RESERVOIR OF THE SOUND SUPPRESSOR SYSTEM.
by H. F. Bauer. Jan 66, 113p NASA-TN-D-3165

Descriptors: *Noise suppressor, *Rocket engine noise, *Sound wave, *Water flow.

N66-17662 **Field 20D**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
ON A FUNDAMENTAL DAMPING LAW FOR FUEL SLOSHING.
by H. A. Cole Jr. Mar 66, 12p NASA-TN-D-3240

Descriptors: *Cylindrical tank, *Ring structure, *Damping, *Fuel tank, *Liquid sloshing.

N66-18053 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
College of Aeronautics, Cranfield (England).
ON A FIRST-ORDER WAVE THEORY FOR A RELAXING GAS FLOW.
by J. F. Clarke. Apr 65, 32p COA-AERO-182

Descriptors: *Gas flow, *Piston, *Wave equation, *First order equation, *Gas tube, *Relaxation.

N66-18428 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Catholic Univ. of America, Washington, D. C.
CONCENTRATION PROFILE ESTABLISHMENT OF BINARY GAS MIXTURE IN SWIRL AND DUCT FLOWS.
by T. W. Kao. Mar 66, 35p
Grant NsG-586
NASA-CR-399

Descriptors: *Density distribution, *Mathematical model, *Ducted flow, *Gas mixture.

N66-18436 **Field 20D**
CFSTI Prices: HC$3.00 MF$0.75
Space Research Inst., McGill Univ., Montreal (Quebec).
AN INTEGRAL MODEL FOR THE SIMILAR EXPANSION OF A GAS CLOUD INTO A VACUUM.
by C. L. Murphy. 20 Jan 66, 61p SR1-1-TN-2
Contract NAS3-4190
NASA-CR-54412

Descriptors: *Gas expansion, *Hypervelocity impact, *Mathematical model, *Integral equation.

N66-18465 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
General Dynamics/Astronautics, San Diego, Calif.
LIQUID RESPONSE TO AN ORIENTATION MANEUVER.
30 Jul 62, 35p Rept. no. 55D-859-17
NASA-CR-54497

Descriptors: *Spacecraft maneuver, *Centaur project, *Liquid propellant.

AD-635 546 **See Field 4B**

AD-635 581 **See Field 8L**

AD-635 632 **See Field 22B**

AD-635 683 **See Field 20M**

AD-635 783 **See Field 13J**

AD-635 832 **See Field 13G**

AD-635 835 **See Field 13G**

AD-635 880 **See Field 12A**

AD-635 919 **See Field 4B**

AD-635 932 **See Field 8H**

AD-635 933 **See Field 19D**

AD-635 938 **See Field 13J**

AD-635 951 **See Field 1C**

AD-636 103 **See Field 19G**

AD-636 110 **See Field 14E**

AD-636 114 **See Field 21E**

AD-636 176 **See Field 19H**

AD-636 182 **See Field 20I**

AD-636 218 **See Field 8C**

AD-636 225 **See Field 8C**

AD-636 257 **See Field 20L**

N66-14689 **See Field 20A**

20E. MASERS AND LASERS

AD-432 297 **Field 20E, 9B**
CFSTI Price: HC$1.00
International Business Machines Corp., Poughkeepsie, N. Y. Development Lab.
USE OF OPTICAL MASERS IN DISPLAYS AND PRINTERS.
Supplement to Final rept. 7 Oct-31 Dec 63.
by H. Fleisher, and K. Kosanke. 31 Dec 63, 24p Rept. no. 4
Contract DA-36-039-AMC-00118 (E)
See AD-428 610, AD-468 433.

Descriptors: (*Lasers, Input-Output Devices), (*Display systems, Lasers), (*Computers, Lenses), Control systems, Models (Simulations), Optical Properties, Electrical properties, Tests, Computers, Display systems, Electrodes, Electron optics.

The possibility of controlling the output of an optical maser by means of an electrically controllable Fresnel lens has been investigated. The zones of a Fresnel lens have been calculated and a laboratory model of such a device has been built. This device has been tested optically and electrically. The fringent field effect occurring in a slit between two adjacent electrodes has been investigated experimentally. The results of these measurements are shown. (Author)

AD-444 956 **Field 20E, 9B**
CFSTI Price: HC$3.00
International Business Machines Corp., Poughkeepsie, N. Y. Development Lab.
USE OF OPTICAL MASERS IN DISPLAYS AND PRINTERS.
Quarterly rept. no. 3, 24 Feb-23 May 64.
by W. Kulcke, K. Kosanke, E. Max, and H. Fleisher. 23 May 64, 73p Rept. no. 5
Contract DA-36-039-AMC-00118 (E)
See also AD-432 297.

Descriptors: (*Lasers, Input-output devices), (*Display systems, Lasers), (*Computers, Lenses), Focusing, Deflection, Refraction, Optical images, Crystals, Specifications, Light.

The report is concerned with further investigations into the Digital Electro-Optic Deflector. Design specifications related to aperture, spot size, spot position and background light (noise) are calculated as functions of the number of deflection stages for various crystal materials. From the calculations, the specifications of the birefringent and electro-optic crystals and their tolerances were evaluated for a two-dimensional deflector of 256 x 256 positions. The relation between the address of an output position and the input signal to the switches is reported; and the distribution of noise, i.e. the light intensity in unswitched positions is described. Further investigations refer to the frequency response and the electrode problem of the electro-optic crystals. Two electronic circuits which appear to be suited for high speed, low power switching of the light deflector are discussed. (Author)

AD-452 259 **Field 20E, 9B**
CFSTI Price: HC$2.00
International Business Machines Corp., Poughkeepsie, N. Y. Development Lab.
USE OF OPTICAL MASERS IN DISPLAYS AND PRINTERS.
Quarterly rept. no. 4, 24 May-23 Aug 64.
by W. Kulcke, K. Kosanke, E. Max, and H. Fleisher. 23 Aug 64, 45p Rept. no. 6
Contract DA-36-039-AMC-00118 (E)
See also AD-444 956.

Descriptors: (*Lasers, Input-output devices), (*Display systems, Lasers), (*Computers, Lenses), Electron optics, Calcite, Refractive index, Focusing, Optical images, Optical equipment, Models (Simulations), Specifications, Polarization, Light, Bonding, Refrac-

tion, Deflection, Single crystals, Switching circuits, Electronic switches.

The report is concerned with the construction of a model of a digital electro-optic deflector with 256 x 256 output positions. Evaluation of the specifications of the deflector have been continued. This includes the influence of temperature on the splitting angle between ordinary and extraordinary rays in the birefringent elements. It also includes an analytical evaluation of the influence of fabrication tolerances and bandwidth of light on the background light. Compensation of focal depth into the deflector affects the distribution of background light. The effect is also discussed for various methods of compensation. Birefringent calcite crystals were cemented successfully; results are reported. A lens system for widening the laser beam to the full aperture of the deflector and for focusing the beam to the output plane is specified. Further investigations refer to the problem of electroding the electro-optic crystals. One of the suggested electronic switches for high-speed, low-power operation -- the second harmonic phase modulated switch -- was investigated. The experiments were performed at different speeds and voltages with promising results. (Author)

AD-457 984 **Field 20E, 9B**
CFSTI Price: HC$2.60
International Business Machines Corp., Poughkeepsie, N. Y. Development Lab.
USE OF OPTICAL MASERS IN DISPLAYS AND PRINTERS.
Quarterly rept. no. 5, 24 Aug-23 Nov 64.
23 Nov 64, 28p Rept. no. 7
Contract DA-36-039-AMC-00118 (E)
See also AD-452 259.

Descriptors: (*Lasers, Input-Output Devices), (*Display systems, Lasers), (*Computers, Lenses), Potassium compounds, Data Processing Systems, Coating, Focusing, Refraction, Optical Images, Crystals, Electron optics, Models (Simulation), Optical equipment.

This report is concerned with further investigations into the Digital Electro-Optic Light Deflector. It contains additional analytical results about the amount of background light in the deflector, and distribution of the background light about the output plane. The birefringent calcite crystals were cemented to path compensated units for use in the deflector model. Test results of these units are reported. Some progress was achieved with respect to the electrodes of the KD*P crystals. The cement originally planned for use will be replaced by another optical cement. Reasons for the change and test results with the new cement are reported. A high frequency, high voltage generator to test the electro-optic crystals was completed. Specifications and circuit of the generator are described. Progress on energy conserving high voltage switches is reported. (Author)

AD-468 433 **Field 20E, 9B**
CFSTI Prices: HC$5.60 MF$0.50
International Business Machines Corp., Poughkeepsie, N. Y. Systems Development Div.
USE OF OPTICAL MASERS IN DISPLAYS AND PRINTERS.
Final rept. no. 8, 24 Nov 64-23 May 65.
by Harold F. Fleischer, Warner Kulke, Kurt Kosanke, and Erhard Max. 23 May 65, 51p
Contract DA-36-039-AMC-00118
See also AD-428 610, AD-432 297.

Descriptors: (*Lasers, Input-Output Devices), (*Display systems, Lasers), (*Computers, Lenses), Focusing, Display systems, Optical images, Switching circuits, Circuits, Design, Waveform generators, Refraction, Deflection.

The report describes the design and construction of the peripheral components required for a model of a two-dimensional digital electro-optic light deflector for 256 x 256 positions. The description of a unit for high-speed switching and modulation includes the effect of the signal of a high-speed electronic switching circuit on the light components transmitted through a KDP crystal. An electro-optic modulator is used for strobing the light beam. Electronic circuits as well as their mechanical design are discussed. A beam widener for expanding the laser beam to the aperture of the deflector, the mechanical design of the deflecting system, mounting of the electro-optic and birefringent crystals, and the electrical circuit for push-button control of the deflector are also discussed. A 60-cps square-wave generator is an optional power supply or control unit. An analysis of power dissipation discusses the problem connected with increased switching speeds. (Author)

AD-635 889 **Field 20E**
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring Md. Applied Physics Lab.
THE OUTPUT POWER AND DURATION OF GENERATION OF A RUBY OPTICAL QUANTUM GENERATOR AS A FUNCTION OF THE PUMPING.
by R. I. Gintoft, and A. M. Sarzhevskii. 21 Jun 66, 9p TG-230-T479
Contract NOw-62-0604-c
TT-66-61808
Trans. of Akademiya Navuk BSSR, Minsk. Doklady, v9 n9 p578-80 1965.

Descriptors: (*Lasers, Pumping (Electronics)), Ruby, Power, Oscillation, Interferometers, USSR.

The conditions required to obtain maximum output power from a ruby laser as a function of pumping conditions was investigated experimentally for several values of the interferometer base. At minimum distance, the output increases with increased pumping, but at greater distances the output levels off and at still greater distances, it undergoes a maximum, all at the same pumping power. A mechanism is proposed to account for these effects. (Author)

AD-636 046 **Field 20E**
CFSTI Prices: HC$1.00 MF$0.50
Microwave Lab., Stanford Univ., Calif.
ENERGY TRANSFER IN SOLID LASER MATERIALS.
Technical summary rept. no. 8, 1 Feb-30 Apr 66.
by A. L. Schawlow. Jun 66, 4p ML-1441
Contract Nonr-225 (78), ARPA Order-306-64
See also AD-628 076.

Descriptors: (*Lasers, *Spectroscopy), Atomic energy levels, Solids, Instrumentation, Light pulses, Image orthicons.

Work continued on a new experimental apparatus for studying spectra of short lived excited states. This included a fast pulsed light source and an image orthicon tube for detection. (Author)

AD-636 090 **Field 20E, 20A, 20L, 20I K**
CFSTI Prices: HC$1.00 MF$0.50
Microwave Lab., Stanford Univ., Calif.
MICROWAVE RESEARCH.
Quarterly status rept. no. 28, 1 Nov 65-31 Jan 66. Apr 66, 18p ML-1424
Contract Nonr-225 (48)
See also AD-628 941.

Descriptors: (*Microwave frequency, Scientific research), (*Acoustics, Amplifiers), (*Lasers, Scientific research), Optics, Semiconductors, Oscillation, Plasma physics, Ferromagnetic materials, Theory.

Contents: Acoustic wave amplification studies, optical maser research, tunable lasers, geometrical optics of acoustic waves, oscillations in semiconductors, theory of nonuniform plasmas, bulk instabilities in ferromagnetic metals.

AD-636 250 **Field 20E, 20F**
CFSTI Prices: HC$3.00 MF$0.75
Hughes Research Labs., Malibu, Calif.
HIGH POWERED DIFFRACTION LIMITED RAMAN LASER.
Final rept., 15 May 65-14 Apr 66.
by F. J. McClung, D. H. Close, R. W. Hellwarth, and W. G. Wagner. May 66, 65p
Contract Nonr-4849 (00), ARPA order-306
Proj. 4730

Descriptors: (*Lasers, *Diffraction), Light, Scattering, Liquids, Refractive index, Quantum mechanics, Raman spectroscopy.

Identifiers: Raman lasers.

Problems associated with the realization of a high energy, highly coherent Raman laser have been investigated. Since the discovery that the self-focusing of pump radiation and scattered radiation is present in most laboratory Raman lasers and tends to spoil the coherence of the output, the nature and mechanisms of this self-trapping have been the primary objects of study in order that it might be prevented. Time resolved photographic studies have been made which show that the small filaments of self-trapped light in the pump beam persist for only a small fraction of the beam pulse duration and are sufficiently intense to resolve the apparent discrepancy between the average intensity and observed Raman gains. Time integrated photographic studies and photometric studies showed that only purely linearly polarized light preserves its polarization after self-trapping in CS2 and nitrobenzene. Attempts to compare measured nonlinear indices for both circular and linear polarizations with those calculated for various mechanisms were frustrated by this instability in the propagation of circularly polarized light. The instability was explained qualitatively and indicates that electrostriction is not a dominant mechanism. A classical statistical mechanical calculation of the nonlinear index of a liquid (with no macroscopic density changes) showed that the local redistribution of molecules is generally important. This effect will cause perfectly symmetric molecules to have a significant nonlinear index. It is therefore concluded that it is very unlikely that any room temperature liquid will perform as a high energy Raman laser material without beam deterioration due to self-focusing. (Author)

N66-16086 **Field 20E**
CFSTI Prices: HC$5.00 MF$1.00
Wheeler Labs., Inc., Great Neck, N. Y.
DEVELOPMENT OF MACROSCOPIC WAVEGUIDE AND WAVEGUIDE COMPONENTS FOR OPTICAL SYSTEMS.
Final rept. 28 Jan-28 Nov 64.
by H. M. Heinemann, H. W. Redlien, E. R. Schineller, and A. G. Wilson. Jan 66, 144p
Contract NAS12-2
NASA-CR-332

Descriptors: *Laser, *Optical resonator, *Waveguide.

For abstract, see T 66 17.

AD-635 620 **See Field 20L**

AD-635 869 **See Field 5I**

AD-635 879 **See Field 20F**

AD-635 920 **See Field 20B**

AD-636 215 **See Field 9E**

AD-636 216 **See Field 9E**

20F. OPTICS

AD-635 629 **Field 20F, 11C**
CFSTI Prices: HC$1.00 MF$0.50
Bausch and Lomb, Inc., Rochester, N. Y. Research and Development Div.
INFRARED COATING STUDIES.
Final rept. 15 Mar-15 Jun 66.
by A. F. Turner. 15 Jun 66, 13p
Contract DA-44-009-AMC-124 (T)

Descriptors: (*Optical coatings, *Infrared optical materials), (*Infrared filters, Films), Band-pass filters, Low-pass filters, Infrared radiation, Magnesium compounds, Oxides, Reflection, Refractive index, Vapor plating, Vacuum apparatus, Emissivity.

Identifiers: Reststrahlen.

Families of curves were computed for the convenient determination of the refractive index of nonabsorbing quarterwave films on substrates of known index. The refractive indices of films of ZnTe, ZnS and PbCl2 in their non-absorbing infrared regions were determined. Survey reststrahlen measurements were continued to include crystals of PbMoO4, CaWO4, topaz, SiC, GaP and GaAs. Calculations of enhanced reflectance MgO reststrahlen films were carried out. With this technique good rectangular shaped reflection band filters for the 14 to 24 micron region are feasible. Calculations of filters embodying MgO reststrahlen films were made. With them it appears feasible to produce good pass band filters for the 30 micron region, as well as low pass transmission filters cutting sharply at this wavelength.

AD-635 670 **Field 20F, 11C**
CFSTI Prices: HC$2.00 MF$0.50
Bausch and Lomb, Inc., Rochester, N. Y. Research and Development Div.
INFRARED COATING STUDIES.
Quarterly rept. no. 11, 15 Dec 65-14 Mar 66.
by F. Sulzbach, and A. F. Turner. 14 Mar 66, 33p
Contract DA-44-009-AMC-124 (T)
See also AD-635 629.

Descriptors: (*Optical coatings, *Infrared optical materials), (*Infrared filters, Films), Reflection, Aluminum compounds, Oxides, Neodymium compounds, Calcium compounds, Fluorides, Silicon compounds, Titanium compounds, Magnesium compounds, Lithium compounds, Hafnium compounds, Zirconium compounds, Vapor plating, Infrared radiation, Spectra (Infrared).

Identifiers: Reststrahlen.

An experimental study was made of the reflectance of thick evaporated films in their reststrahlen regions of the infrared spectrum. Although only a few of the materials studied gave films having an efficient rst reflectance, many of them appeared optically acceptable for use as interference films. These may be as being clear without color and free of turbidity, i.e. designated therein as clear or only slightly scattering (sl. scatter.) They include films showing no cracks in optical thickness up to six microns or more, depending on substrate temperature, of Al2O3, Nd2O3, CaF2, siO2, Ti2O3, MgO, MgF2, LiF, HfO2 and ZrO2. For rst reflectance purposes, e.g. reflection filtering, films of MgO were best, there being no difficulty in obtaining the full reflectance of the parent crystal.

AD-635 879 **Field 20F, 20E**
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
ON THE DIFFRACTION OF PARTIALLY COHERENT LIGHT.
by B. A. Sotskii, and A. M. Goncharenko. 23 Jun 66, 10p TG-230-T478
Contract NOw-62-0604-c
TT-66-61806
Trans. of Akademiya Navuk BSSR, Minsk. Doklady, v8 n7 p438-40 1964.

Descriptors: (*Light, Diffraction), Light transmission, Lasers, Ruby, USSR.

Identifiers: Coherent light.

The diffraction of partially coherent light at a narrow slit is calculated for a given coherence function satisfying the wave equation at all points. It is shown that the divergence angle depends only on the wavelength and the coherence interval but not on the diameter of the end face. Since the divergence angle and coherence interval are uniquely related, and each can be obtained independently, a direct experimental check of the relation between the two is possible. Applicability of the results to describe the radiation from a dielectric resonator, e. g., a ruby laser, is discussed. (Author)

AD-635 967 **Field 20F**
CFSTI Prices: HC$1.60 MF$0.50
Research and Advanced Development Div., Avco Corp., Wilmington, Mass.
MIE SCATTERING IN THE FORWARD AREA.
by Rudolf Penndorf. Sep 62, 19p RAD-TR-62-55, Scientific-7
Contract AF 19 (604)-5743
AFCRL-62-1026
Rept. on Research on Aerosol Scattering in the Infrared. Pub. in Infrared Physics, v2 p85-102 1962. See also AD-267 348.

Descriptors: (*Aerosols, Scattering), (*Light, Scattering), Refractive index, Rayleigh scattering, Infrared radiation, Oscillation.

The scattering of light in the forward area is investigated from a theoretical point of view, and it is based on all available data computed according to the Mie formulas. A wide range of refractive indices, n, from n = 1.05 to n = 2.0 was selected. The behavior of these scattering coefficients is investigated and described in detail. It is found that for example, while i theta shows major oscillations, only plateaus are found for pM, and their width is related to the refractive index. The amplitude of the major oscillation decreases with increasing size parameter. Superimposed on these oscillations are ripples, the phase of which agrees exactly with the phase of the ripples for the total scattering coefficient K. Several ripple systems are noted and some regularity in their appearance is clearly indicated. The multi-valueness of the scattering function and its consequences are also pointed out. This is followed by a careful investigation of practical limits for the Rayleigh and the Mie region. (Author)

AD-636 035 **Field 20F, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Rutgers - The State Univ., New Brunswick, N. J. School of Chemistry.
MEASUREMENTS OF THE INFRARED SPECTRAL TRANSMITTANCE OF OPTICALLY THICK SAMPLES.
Technical rept. no. 2, Dec 65-Jun 66.
by M. J. D. Low, and L. Abrams. 20 Jun 66, 23p
Contract Nonr-404 (19)

Descriptors: (*Infrared spectroscopy, Test methods), Spectra (Infrared), Light transmission, Measurement, Infrared radiation, Spectrophotometers, Temperature, Styrene plastics, Paper, Glass.

Continued improvements in instrumentation have led to a wide use of infrared transmission spectroscopy, and have permitted the examination of samples of limited transparency. However, although there is no particular problem with samples having about 2% transmittance or more, considerable difficulties arise if the transmittance is in the fractional percent range. The present paper is concerned with such energy-limited spectral measurements. The effects of self-emitted radiation, ordinate expansion, and scan time are considered. (Author)

N66-15496 **Field 20F**
CFSTI Prices: HC$3.00 MF$0.50
Electro-Optical Systems, Inc., Pasadena, Calif.
DEVELOPMENT OF A SECOND GENERATION PROTOTYPE REFLECTOMETER FOR REFLECTANCE MEASUREMENT IN SPACE.
Final technical rept.
by P. A. Button, D. H. McClelland, and A. A. Olsen. 1963, 54p EOS-6520
Contract NAS1-4660
NASA-CR-66010

Descriptors: *Reflectometer, *Measuring apparatus, *Optical instrument.

For abstract, see T 66 17.

N66-18096 **Field 20F**
CFSTI Prices: HC$2.00 MF$0.50
University Coll., London (England).
THE APPLICATION OF IMAGE TUBES TO ULTRAVIOLET SPECTROMETRY FROM ASTRONOMICAL SATELLITES.
by A. Boksenberg. Nov 65, 40p ESRO-SM-5

Descriptors: *Image tube, *Vidicon, *Image orthicon tube, *Television camera, *Ultraviolet spectrometer.

AD-636 142 **See Field 17H**

AD-636 183 **See Field 4A**

AD-636 250 **See Field 20E**

20G. PARTICLE ACCELERATORS

AD-636 185 **Field 20G**
CFSTI Prices: HC$1.00 MF$0.50
Armed Forces Radiobiology Research Inst., Bethesda, Md.
A PROCEDURE FOR MINIMIZING PERSONNEL HAZARDS WHILE CHANGING TRITIUM TARGETS IN ACCELERATORS.
Technical note.
by J. A. Aberle, A. R. MacDonald, and S. W.Porter Jr. May 66, 23p AFRRI-TN-66-5

Descriptors: (*Ion accelerators, Radiation effects), (*Tritiated compounds, Shielding), Particle accelerators, Gloves.

A detailed procedure for minimizing personnel hazards while changing tritium targets in accelerators is given. The step-by-step process utilizes an airtight stainless steel glove box. The use of a plastic containment area is also described. (Author)

N66-15595 **Field 20G**
CFSTI Prices: HC$1.00 MF$0.50
TRW Systems, Redondo Beach, Calif. Physical Electronics Lab.
HIGH-REPETITION-RATE PARTICLE INJECTOR FOR ELECTROSTATIC ACCELERATOR.
by D. G. Becker. Jul 65, 10p STL-4158-6014-TU-000
Contract NASw-936
NASA-CR-69445

Descriptors: *Impact testing machine, *Micrometeoroid, *Particle accelerator, *Charged particle, *Electrostatic instrument.

For abstract, see T 66 17.

N66-15596 **Field 20G**
CFSTI Prices: HC$1.00 MF$0.50
TRW Systems, Redondo Beach, Calif. Physical Electronics Lab.
ELECTRONIC PARTICLE-PARAMETER ANALYZING SYSTEM FOR AN ELECTROSTATIC HYPERVELOCITY PROJECTOR.
by D. O. Hansen. Jul 65, 16p STL-4158-6016-TU-000
Contract NASw-936
NASA-CR-69446

Descriptors: *Electrostatic instrument, *Hypervelocity accelerator, *Particle accelerator.

PB-170 411 **Field 20G, 14B**
CFSTI Prices: HC$4.00 MF$0.75
California Univ., Los Angeles. Dept. of Engineering.

DEVELOPMENT AND APPLICATION OF AN INTERMEDIATE-ENERGY HIGH-INTENSITY MOLECULAR BEAM.
Status rept. no. 2.
by Eldon L. Knuth. Apr 66, 87p Rept. no. 66-19
Grant NSF-GK-580
See also NASA N64-11260.

Descriptors: (*Molecular beams, Instrumentation), Jets, Supersonic flow, Superaerodynamics, Chemical bonds, Shock waves, Orifices, Argon, Scattering, Collimators, Glass, Brass, Surfaces.

Bases for designs of the several components of a intermediate-energy high-intensity molecular beam are presented. Beam energies of the order of 1 ev and beam intensities of the order of 10 to the 20th power molecules /steradian-sec are realized as a consequence of heating the beam gas in an electric arc and converting then the energy of thermal motion into energy of directed motion in a supersonic jet. Three auxiliary laboratory systems (a room-temperature supersonic molecular beam, a low-density free-jet system, and a free-molecule effusive-flow system) are described briefly. A correlation of beam-performance measurements indicates that the skimmer-orifice flow rate which maximizes the beam intensity is realized, fortunately, with the skimmer orifice located slightly upstream from the point at which the free-jet shock structure would interact with the leading edge of the skimmer. Scattering of argon atoms (with energies up to 0.9 ev) from room-temperature contaminated glass and brass surfaces was found to be strongly asymmetric with the angle of maximum scattering lying between the specular angle and the angle to the normal. (Author)

PB-170 650 **Field 20G, 20H**
CFSTI Prices: HC$1.50 MF$0.50
Commissariat a l'Energie Atomique, Fortenay-aux-Roses (France). Center d'Etudes Nucleaires.
ETUDE DE LA PULSATION D'UN ACCELERATEUR D'IONS FOURNISSANT DES IMPULSIONS D'UNE DUREE DE 20 NANO-SECONDES (Study of the Pulsation of an Ion Accelerator Giving 20 Nano-Second Pulses).
Doctoral thesis in French.
by Bertrand de Cosnac. 12 Mar 65, 54p CEA-R-2936
Text in French; Attached Summary in English.

Descriptors: (*Ion accelerators, Operation), Ion sources, Design, Electromagnetic pulses, Deuterons, Neutron spectrum, France.

In order to measure fast neutron spectra by the time-of-flight method, a study was made of a pulsed ion-source which was placed on the 600 kV electrostatic accelerator at Fontenay-aux-Roses. Examination was made of: the ion-source itself, its extraction device, the focussing equipment and the pulsation system constituted by a slit which is swept by the beam. Using this ion-source it is possible to obtain a direct current of deutons of over 800 microamps, and clouds having a duration which can be adjusted to between 15 and 40 nano-seconds. (Author)

MURA-718 **See Field 20H**

SLAC-56 **See Field 9B**

UCRL-14680 **See Field 6R**

20H. PARTICLE PHYSICS

AD-635 846 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.75
Nevis Labs., Columbia Univ., Irvington-on-Hudson, N. Y.
RADIATIVE DECAY OF THE MUON.
Doctoral thesis.
by Elliot Bogart. May 66, 95p Nevis-151, CU-255
Contract Nonr-266 (72)
R-551.

Descriptors: (*Muons, *Decay schemes), (*Meson reactions, Decay schemes), Positrons, Neutrinos, Gamma rays, Synchrocyclotrons, Scintillation counters, Nuclear spectroscopy, Fermions.

The radiative decay of the muon, positive-muon to positron + neutrino + e-neutrino + mu'-antineutrino was measured using muons from the Columbia University Nevis Synchrocyclotron. The positron and gamma-ray decay products were observed at relative angles near 180 degrees, using scintillation counters and two 9 in. x 10 in. NaI crystals, which enabled simultaneous measurement of the positron and gamma energies. The pulses from the crystals were displayed on oscilloscopes and photographed, and the measured amplitudes of these pulses were calibrated using the positron spectrum of the nonradiative decay. The two-dimensional energy spectrum for positrons and gammas was obtained for about 900 events, after subtraction of background. This spectrum and the measured rate, obtained by normalizing to the nonradiative decay, were compared with theoretical predictions for the radiative decay. The results were in good agreement with the theory, within statistics, for the case of pure V-A coupling. (Author)

AD-635 872 **Field 20H**
CFSTI Prices: HC$4.00 MF$1.00
Columbia Univ., New York. Electronics Research Labs.
EFFECTS OF MECHANICAL AND THERMAL ELECTRODE PROPERTIES ON THE BEHAVIOR OF THE FLUID TRANSPIRATION ARC.
Final technical rept. 1 Nov 63-31 Oct 64.
by C. Sheer, P. S. Tschang, and C. G. Stojanoff.
Aug 65, 146p
Contracts AF 33 (615)-1141, AF 49 (638)-1395
Projs. AF-7063, AF-9783
Tasks 706303, 978302
ARL-65-163
See also AD-419 199.

Descriptors: (*Plasma jets, *Electrodes), (*Electric arcs, Electrodes), Cathodes, Anodes, Porous materials, Gas discharges, Probes (Electromagnetic), Thermocouples, Hall effect, Fiber optics, Tungsten, Cooling, Mechanical properties, Thermal properties.

Identifiers: Plasma probes, Plasma diagnostics.

A triple cathode, single anode arc assembly, designed to produce a symmetrical free-burning plasma jet, was completed and placed into operation. A second arc assembly with a single gas-injection cathode, was also constructed for the double purpose of testing porous anodes and accelerating the acquisition of diagnostic data. Diagnostic instrumentation was developed, based on high speed transient probing with miniature sensing elements. Work was carried forward on the development of porous anodes. Diagnostic experiments include measurements of arc terminal characteristics, current density distribution, temperature variations, potential distribution, plasma luminosity distribution and calorimetry experiments. The influence of forced convection into the negative column near the cathode was separately investigated. A two-dimensional computer analysis of transpiration cooling of the porous anode was worked out.

AD-635 915 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Dept. of Physics.
THE N IN DEUTERON REACTIONS AS A LANDAU SINGULARITY.
by Melvin Month. 1966, 11p
Contract Nonr-1834 (05)

Descriptors: (*Deuteron reactions, *Nuclear energy levels), Field theory, Perturbation theory, Compton scattering, Photonuclear reactions.

Identifiers: Singularity.

Recently, some attempts have been made to describe what is termed the N effect in various deuteron reactions, using field theoretical (perturbation theory) methods. Previously, the N peaks were introduced in a phenomenological way -- i.e., as final state interactions. It is pointed out, in a qualitative way that a possible fallacy exists in the new approach (and in the phenomenological methods as well), and an alternative mechanism for producing the N effect is suggested.

AD-635 916 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Dept. of Physics.
ROLE OF MESON CURRENT IN THE DETERMINATION OF NEUTRON FORM FACTORS FROM ELASTIC ELECTRON-DEUTERON SCATTERING.
by Klaus Dietz, and Melvin Month. 1966, 9p
Contract Nonr-1834 (05)

Descriptors: (*Mesons, *Nuclear scattering), (*Electrons, Elastic scattering), (*Deuterons, Elastic scattering), Neutrons, Field theory, Nucleons, Moments.

Information on the electro-magnetic (e-m) neutron form factors is mainly deduced by inference from electron-deuteron scattering. Consideration is given to the use of elastic-scattering data; and results are compared with those of DeVries et al. (Phys. Rev. v134 pB848 1964) who obtained their results by using only inelastic electron-deuteron scattering data.

AD-635 969 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Dept. of Physics.
ANALYSIS OF THE REACTION GAMMA-RAY + PROTON TO ETA-BARYON + PROTON NEAR THRESHOLD.
by R. K. Logan, and F. Uchiyama-Campbell.
1966, 9p
Contracts Nonr-1834 (05), AT (11-1)-1018

Descriptors: (*Baryons, *Photonuclear reactions), (*Gamma-ray cross sections, Photonuclear reactions), Protons, Nuclear resonance, Field theory.

Identifiers: ETA baryons.

The recent measurements of eta photoproduction 'gamma-ray + proton to eta-baryon + proton', reveal an enhancement of the cross section, sigma-gamma, just above threshold. This is very similar to the enhancement of the 'negative-pion + proton to eta-baryon + neutron' cross section, sigma-pi, which we have shown can be explained by an S wave resonance with an approximate mass and width of 1560 and 150 MeV respectively. It is shown that this resonance can also explain the enhancement of sigma-gamma.

MURA-718 **Field 20H, 20G**
CFSTI Prices: HC$1.00 MF$0.50
Midwestern Universities Research Association, Stoughton, Wis.
A SEARCH FOR MASSIVE PARTICLES IN COSMIC RAYS.
by B. Dayton, F. Mills, C. Radmer, and M. L. Good. 18 Apr 66, 28p
Contract AT (11-1)-718
Prepared in cooperation with Michigan Univ., Ann Arbor and Wisconsin Univ., Madison.

Descriptors: (*Cosmic rays, Elementary particles), (*Elementary particles, Cosmic rays).

For abstract, see N 20 15.

N66-12247 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
Grumman Aircraft Engineering Corp., Bethpage, N. Y. Research Dept.

PION PRODUCTION IN HIGH ENERGY COSMIC RAY COLLISIONS.
by M. Lieber, S. N. Milford, and M. S. Spergel.
Jun 65, 43p RE-215J
Contract NASw-699
NASA-CR-68092

Descriptors: *Nucleon-Nucleon scattering, *Angular distribution, *Inelastic collision, *Pion.

N66-14916 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.50
General Atomic, San Diego, Calif. John Jay Hopkins Lab. for Pure and Applied Science.
THE ENERGY DEPENDENCE OF THE NEUTRON CAPTURE CROSS SECTION OF THE TUNGSTEN ISOTOPES FROM .01 TO 10 E V.
by S. J. Friesenhahn, F. H. Frohner, E. Haddad, and W. M. Lopez. 1965, 52p GA-6832
Contract SNPC-27
NASA-CR-54860

Descriptors: *Gamma radiation, *Neutron, *Radiation detector, *Tungsten.

N66-15073 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Nuclear Energy Commission, Sacavem (Portugal). Physics Div.
THE PHONON FREQUENCY DISTRIBUTION OF VANADIUM.
by F. Carvalho, G. Ehret, and W. Glaser. 1964, 18p LFEN-33/BETA/
Prepared for presentation at Symp. on Inelastic Scattering of Neutrons, Intern. Atom. Energy Agency, Bombay, 15-19 Dec. 64.

Descriptors: *Frequency distribution, *Momentum transfer, *Energy transfer, *Phonon, *Vanadium.

N66-15074 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
Comitato Nazionale per l Energia Nucleare, Frascati (Italy). Laboratori Nazionali de Frascati.
A POSSIBLE EXPERIMENT WITH A PROTON POLARIZED TARGET.
by P. Bounin. 19 Jul 65, 28p LNF-65/22

Descriptors: *Experiment design, *Proton, *Electron scattering, *Polarization, *Target.

N66-15411 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PARTICLE SYMMETRIES.
by J. S. Zmuidzinas. 15 Dec 65, 57p JPL-TR-32-797
Contract NAS7-100
NASA-CR-69360

Descriptors: *Quantum mechanics, *Particle theory, *Relativity, *Space-time function, *Symmetry.

N66-15420 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
Stanford Univ., Calif. Stanford Electronics Labs.
MEASUREMENTS OF THE TOTAL ELECTRON CONTENT AND THE EQUIVALENT SLAB THICKNESS OF THE MID-LATITUDE IONOSPHERE.
by R. V. Bhonsle, A. V. DaRosa, and O. K. Garriott. 1964, 31p
Grant NsG-30
NASA-CR-60710

Descriptors: *Doppler effect, *Electron density, *Ionosphere, *Transit IVA satellite.

N66-15620 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.75
Schellenger Research Labs., Texas Western Coll., El Paso.
AN ANALYSIS OF THE RELATION BETWEEN SOLAR RADIO EMISSION AND LARGE SOLAR COSMIC RAY INCREASES.
by A. Shlanta. Jun 65, 68p
Grant NGR-44-020-001
NASA-CR-69433

Descriptors: *Radio emission, *Solar cosmic ray, *Statistical analysis.

N66-15632 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.75
Western Reserve Univ., Cleveland, Ohio.
FUNDAMENTAL STUDIES ON SEMI-CONDUCTOR RADIATION DETECTORS.
Semiannual status rept. 1 Mar - 31 Aug 65.
by K. J. Casper. 1965, 90p
Grant NsG-655
NASA-CR-69479

Descriptors: *Barrier layer, *Beta radiation, *Fortran, *Computer program, *Data analysis, *Silicon radiation detector.

N66-15640 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
TWO-PHASE HYDROGEN DENSITY MEASUREMENTS BY THERMAL NEUTRON ATTENUATION.
by D. F. Shook. Jul 65, 11p NASA-TN-D-2787

Descriptors: *Dynamic response, *Neutron thermalization, *Two-phase flow, *Density measurement, *Liquid hydrogen.

N66-15973 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
Wisconson Univ., Madison. Theoretical Chemistry Inst.
ONE-CENTER AND TWO-CENTER EXPANSIONS OF THE BREIT-PAULI HAMILTONIAN.
by P. R. Fontana, and W. J. Meath. 7 Dec 65, 40p
WIS-TCI-125
Grant NsG-275-62
NASA-CR-69650

Descriptors: *Spin-orbit interaction, *Hamiltonian, *Orbit, *Quantum mechanics.

N66-16054 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Corp., El Segundo, Calif.
MODELS OF THE TRAPPED RADIATION ENVIRONMENT. VOLUME I. INNER ZONE PROTONS AND ELECTRONS.
by J. I. Vette. 1966, 59p
Contracts NASA Order-W-11683, AF 04 (695)-469
NASA-SP-3024

Descriptors: *Electron flux, *Geomagnetic field, *Inner radiation belt, *Proton energy, *Trapped particle.

N66-17242 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
EXCITATION OF H-ATOMS BY FAST PROTONS.
by I. M. Cheshire, and H. L. Kyle. Dec 65, 10p
NASA-TM-X-55410, X-641-65-505

Descriptors: *Excited state, *Hydrogen atom, *Proton, *Born approximation.

N66-17243 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
PLASMA PRESSURES IN THE MAGNETOSPHERE.
by M. P. Nakada. Dec 65, 22p NASA-TM-X-55411, X-641-65-507

Descriptors: *Plasma spectrum, *Solar wind, *Geomagnetic field, *Magnetopause.

N66-17248 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
SOURCE OF OUTER ZONE PROTONS.
by W. N. Hess. Sep 65, 37p NASA-TM-X-55375, X-640-65-389
Presented at the Advanced Study Inst. on Radiation Trapped in the Earth's Magnetic Field, Bergen, Aug 16-Sep 3 1965.

Descriptors: *Particle diffusion, *Proton energy, *Radiation belt, *Flux.

N66-18060 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Institute of Nuclear Research, Warsaw (Poland).
NUCLEAR INTERACTIONS OF VERY HIGH ENERGY WITH LARGE ENERGY TRANSFER INTO NEUTRAL PIONS.
by Ch. P. Babayan, S. I. Brikker, N. L. Grigorov, A. V. Podgurskaya, and A. I. Savelyeva. Jul 65, 23p INR-650/VI/PH

Descriptors: *Nuclear interaction, *Pion, *Energy transfer, *Neutral particle.

N66-18075 **Field 20H**
CFSTI Prices: HC$4.00 MF$0.75
Institute of Nuclear Research, Warsaw (Poland).
TABLES OF THE FUNCTIONS X (C1 MINUS NU) AND X PLUS OR MINUS (C1, C2) FOR THE NUMERICAL SOLUTION OF SLAB GEOMETRY NEUTRON TRANSPORT PROBLEMS, PART II.
by K. Kowalska. May 65, 111p Rept. nos. 302/65, 630/IX-A/FR

Descriptors: *Mathematical table, *Geometry, *Neutron physics.

N66-18078 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Laboratoire de Physique Theorique et Des Hautes Energies, Orsay (France).
PARTIALLY CONSERVED AXIAL CURRENT AND PARITY CONSERVING NON-LEPTONIC DECAYS OF HYPERONS.
by S. Badier, and C. Bouchiat. Jan 66, 13p TH/125

Descriptors: *Hyperon, *Parity, *Particle decay, *Quantum mechanics, *Symmetry, *Theoretical physics.

N66-18079 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Comitato Nazionale per L'energia Nucleare, Frascati (Italy).
VECTOR BOSON HUNTING WITH ADONE.
by C. Bernardini. 27 Dec 65, 11p LNF-65/47

Descriptors: *Boson, *Electron, *Meson, *Positron annihilation, *Photon, *Vector meson.

N66-18116 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.75
Aktiebolaget Atomenergi, Stockholm (Sweden).
SYSTEMATICS OF ABSOLUTE GAMMA RAY TRANSITION PROBABILITIES IN DEFORMED ODD-A NUCLEI.
by S. G. Malmskog. Nov 65, 69p AE-205

Descriptors: *Gamma radiation, *Mathematical model, *Nuclear structure, *Transition probability.

N66-18122 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Laboratoire de Physique Theorique et Des Hautes Energies, Orsay (France).

SOME APPLICATIONS OF THE ALGEBRA OF CURRENT TO ELECTROMAGNETIC INTERACTIONS.
by M. Gourdin. Jan 66, 23p TH/127
Presented at the Moriond Meeting on Electromagnetic Interactions.

Descriptors: *Meson, *Theoretical physics, *Baryon, *Electron, *Elementary particle, *Matrix algebra.

N66-18134 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Laboratoire de Physique Theorique et Des Hautes Energies, Orsay (France).
PION ELECTROPRODUCTION.
by J. P. Loubaton. Jan 66, 12p TH/128
Presented at the Moriond Meeting on Electromagnetic Interactions.

Descriptors: *Form factor, *Photoproduction, *Pion, *Electromagnetic interaction.

N66-18151 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.75
Laboratoire de Physique Theorique et Des Hautes Energies, Orsay (France).
WEAK INTERACTIONS AND SYMMETRIES.
by B. Despagnat. Nov 65, 75p

Descriptors: *Particle decay, *Group theory, *Symmetry.

N66-18418 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Atomic Energy of Canada, Ltd., Chalk River (Ontario).
NEUTRON ABSORPTION CROSS SECTION OF GROSS FISSION PRODUCTS OF U233, U235, AND PU239.
by R. W. Durham, M. Lounsbury, and A. Okazaki. Nov 65, 21p AECL-2510

Descriptors: *Neutron, *Uranium 235, *Absorption cross section, *Fission product, *Plutonium 239.

PB-170 646 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
MISE EN EVIDENCE DES FLUCTUATIONS DE SECTIONS EFFICACES DU MODELE STATISTIQUE PAR L'ETUDE DE LA REACTION 27Al (d,alpha)25Mg (Evidence for Fluctuations in Statistical Model Cross Sections from the Study of 27Al (d,alpha)25Mg Reaction.
Doctoral thesis in French.
by Lily Papineau. 22 Jun 65, 95p CEA-R-2876
Text in French; Attached Summary in English.

Descriptors: (*Aluminum, Deuteron bombardment), (*Deutron cross sections, Mathematical models), (*Alpha particle reactions, Nuclear cross sections), Magnesium, Silicon, Nuclear reactions, Statistical analysis, Excitation, France.

A complete set of experimental data was obtained for the reaction 27Al (d, alpha)25Mg for excitation energies in the compound nucleus 29Si between 19.7 and 27.4 MeV, in order to compare with the theoretical predictions of the statistical model of nuclear reactions including fluctuations. Numerical calculations of the theoretical cross sections were made and contributions to methods of analysis of fluctuating excitation functions are given. The results confirm strong evidence for statistical fluctuations in nuclear cross sections. (Author)

UCRL-16768 **Field 20H, 20J**
CFSTI Prices: HC$2.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Berkeley.
COLLECTIVE POTENTIAL ENERGY, QUANTUM MECHANICAL FLUCTUATIONS AND TUNNELLING EFFECTS IN EVEN NUCLEI. PART I.
by Krishna Kumar. Mar 66, 48p
Contract W-7405-eng-48

Descriptors: (*Even-even nuclei, Theory).

For abstract, see N 20 15.

AD-635 692 **See Field 18D**

AD-635 818 **See Field 4A**

AD-636 034 **See Field 7E**

AD-636 036 **See Field 7E**

AD-636 093 **See Field 4A**

PB-170 650 **See Field 20G**

20I. PLASMA PHYSICS

AD-456 364 **Field 20I**
CFSTI Price: HC$1.00
Aerospace Technology Div., Library of Congress, Washington, D. C.
HIGH- AND LOW-DENSITY PLASMAS OF NANOSECOND DURATION.
Comprehensive rept. for 1959-1962.
8 Feb 65, 21p ATD-P-65-3
TT-66-60039, N65-18142
Rept. on Surveys of Soviet-Bloc Scientific and Technical Literature.

Descriptors: (*Plasma medium, Scientific research), (*Sparks, Plasma medium), Bibliographies, Abstracts, Processing, Density, USSR, Electric discharges, Glow discharges, Plasma physics.

This report, reviews recent Soviet open-source literature on high- and low-density plasmas of nanosecond duration. The reference material covers the period from 1959 to 1962. The report analyzes the recent work and latest achievements of various institutions and research groups engaged in the field. Earlier developments can be traced on the basis of annotations provided in the references. (Author)

AD-635 761 **Field 20I**
CFSTI Prices: HC$2.00 MF$0.50
Harvard Coll. Observatory, Cambridge, Mass.
THE CALCULATION OF CHEMICAL AND IONIZATION EQUILIBRIUM IN A CONVENTIONAL SHOCK TUBE.
by John C. Rich, and Judith C. Flagg. Jul 66, 32p
Scientific-12
Contract Nonr-1866 (48), Grant NsG-438

Descriptors: (*Plasma medium, *Thermodynamics), (*Shock tubes, Plasma medium), Equations, Atoms, Molecules, Electrons, Ions, Chemical reactions, Ionization, Recombination reactions, Iterative methods.

The equations describing a plasma in local thermodynamic equilibrium are presented and applied to a conventional shock tube. If conditions of local thermodynamic equilibrium exist, these equations give the number densities of the atoms, molecules, ions and electrons that make up the plasma. For practical results an effective iteration scheme is presented for the computer solution of such equations. (Author)

AD-636 120 **Field 20I, 18A**
CFSTI Prices: HC$2.00 MF$0.50
Avco-Everett Research Lab., Everett, Mass.
ON THE EQUILIBRIUM OF ELECTRON CLOUDS IN TOROIDAL MAGNETIC FIELDS.
Research rept.
by J. D. Daugherty, and R. H. Levy. May 66, 32p
Avco-RR-248
Contracts NAS8-20310, AF 49 (638)-1553
Proj. AF-9752
Task 975201

Descriptors: (*Plasma medium, Stability), (*Electrons, Plasma physics), Magnetic fields, Containment, Electric fields, Thermodynamics, Particle trajectories.

The self-consistent equilibrium configurations available to low density toroidal electron clouds under the influence of an external magnetic field and the electric fields due to space and image charges are discussed. The equilibria are dynamic rather than static, but steady. Delta-B, centrifugal and other drifts are shown to be unimportant, in contrast to the situation in toroidal neutral plasmas. Typical equilibria are shown in detail, to zero order in q. The construction of equilibria accurate to order q is shown to be possible but is not carried out in detail. (Author)

AD-636 160 **Field 20I, 20C, 14B**
CFSTI Prices: HC$4.00 MF$0.75
General Electric Co., Philadelphia, Pa. Missile and Space Div.
AN ANALYTICAL STUDY OF THE PHYSICAL PROCESSES IN THE CATHODE REGION OF AN ARC.
Final rept., Feb 62-Jun 65.
by T. H. Lee, Allan Greenwood, W. D. Breingan, and H. P. Fullerton. Apr 66, 127p
Contract AF 33 (657)-8206
Proj. AF-7063
Task 706303
ARL-66-0065

Descriptors: (*Arc heaters, *Plasma physics), (*Electric arcs, Plasma physics), (*Cathodes, Electric arcs), Gas flow, Wind tunnels, Mathematical models, Emissivity, Thermodynamics, Argon, Transport properties.

The objective of the work was to study the fundamental operating processes in the cathode region of an electric arc. The study was primarily theoretical, supplemented with some experimental observations, particularly for arcs in a flow field. A model for the arc between the cathode and the plasma proper was formulated. The governing equations for the different regions of the model were derived and solved numerically by a digital computer. Boundaries between regions were matched as far as possible, to give a self-consistent solution. The solutions obtained indicate that using the model, it is possible to explain electron emission, cathode drop, energy balance, ion current flow and ionization in the transition region for an arc on a refractory cathode in an argon gas. It was thought important to see how the cathode region joins to the contracted portion of the plasma. The energy balance in the contracted region was also studied by treating it as a multicomponent gas with the possibility of its not being in thermal equilibrium. The solution for this region indicates that when flow is an important factor in the energy balance at the arc boundary, there could be a considerable difference between the electron and ion temperatures at the arc boundary. It is believed that this effect must be considered in any study in the entrance region of arc plasma heaters. (Author)

AD-636 182 **Field 20I, 20D, 7D, 4A K**
CFSTI Prices: HC$2.60 MF$0.50
Geophysics Corp. of America, Bedford, Mass.
CHEMICAL RELEASE STUDIES V: RECOMBINATION DURING RADIAL FREE EXPANSION OF A PLASMA SPHERE.
Technical rept.
by A. W. Berger, and D. Golomb. Jan 61, 26p
GCA-TR-61-3-A
Contract AF 19 (604)-7269
AFCRL-202

Descriptors: (*Kinetic theory, Plasma physics), (*Recombination reactions, *Plasma physics), Gas ionization, Ions, Electrons, Nozzle gas flow, Atmospheric sounding, Chemical reactions, Iodine.

Identifiers: Chemical release.

Smith's analysis of ion-electron recombination in nozzle flow is adapted to radial free expansion of a plasma sphere. A 'peeling onion' model is developed; the plasma ball sheds outer layers from an undisturbed core until the center is reached. Each layer in turn serves as a steady state source for the expanding gas. A family of curves of the degree of ionization vs. reduced time for the retreating layers is obtained. The degree of ionization asymptotically approaches a quenched value, beta infinity (r). Evaluation of beta infinity (r) vs. the radii of the source layers indicates that the degree of ionization increases from the edges of the expanding plasma toward the center. The fraction of ions quenched is determined by integration over the volume elements. The recombination of iodine (in argon carrier) released by shattering glass spheres is suggested as an experimental test of the expansion model. (Author)

AD-636 184 **Field 20I, 7C, 8G, 20L K**
CFSTI Prices: HC$3.00 MF$0.75
Aerospace Technology Div., Library of Congress, Washington, D. C.
FOREIGN SCIENCE BULLETIN, VOLUME 2, NUMBER 7.
Jul 66, 94p
TT-66-61854
A Monthly Review of Selected Foreign Scientific and Technical Literature.

Descriptors: (*Plasma physics, USSR), (*Acrylic resins, USSR), (*Geophysics, USSR), (*Solid state physics, USSR), Chemistry, Geology, Microwave relay systems, Aerosols, Transducers, Refractory materials, Superconductivity, Bionics, Bibliographies, Periodicals, Symposia.

CONTENTS: Apparatus and Techniques for Plasma Diagnostics; Development of Polyaryl Esters in the USSR; Soviet Scientific Achievements During 1965; Chemical Sciences, Earth Sciences; Use of a Diffraction Lens as a Passive Repeater in Microwave Relaying; The Effect of Microstructure Parameters of Water Clouds and Fogs on Their Spectral Transmittance in the 0.5-14 Micron Region; Ultrasonic Transducers Based on the Depletion Layer in Cadmium Sulphide; New Refractory Materials; Some Superconducting Properties of 25% Nb - 75% Zr Alloy; All-Union Conference on the Mechanics of Liquids and Gases; Conference on Bionics; Relaxation Processes in Shock Waves; Dynamics of Bodies Having Cavities Filled With Liquid; Transactions of the lst Conference on Physical Metallurgy and Metal Physics of Superconductors. 1964. Physical Metallurgy and Metal Physics of Superconductors.

N66-15390 **Field 20I**
CFSTI Prices: HC$3.00 MF$0.75
Case Inst. of Tech., Cleveland, Ohio.
A STUDY OF THE THEORY AND MEASUREMENT OF PLASMA DIFFUSION.
Master's thesis.
by G. A. Otteni. Apr 65, 89p A-35
Grant NsG-198
NASA-CR-69343

Descriptors: *Diffusion coefficient, *Dyadic, *Plasma diffusion, *Rectangular guide.

For abstract, see T 66 17.

N66-15427 **Field 20I**
CFSTI Prices: HC$3.00 MF$0.75
Case Inst. of Tech., Cleveland, Ohio.
COLLISIONAL INTERACTIONS OF ENERGETIC TEST ELECTRONS WITH A PLASMA.
by M. R. Smith. Jul 65, 96p A-39
Grant NsG-198
NASA-CR-68537

Descriptors: *Plasma-particle interaction, *Electron collision, *Energy loss.

N66-15440 **Field 20I**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Los Angeles. Plasma Physics Group.
PROPAGATION OF ION ACOUSTIC WAVES ALONG CYLINDRICAL PLASMA COLUMNS.
by A. Y. Wong. Jul 65, 7p R-1
Grant NGR-05-007-066
NASA-CR-69387

Descriptors: *Ionic wave, *Acoustic vibration, *Boundary value, *Plasma cylinder.

N66-15441 **Field 20I**
CFSTI Prices: HC$2.00 MF$0.50
California Univ., Los Angeles. Plasma Physics Group.
STABILITY LIMITS FOR LONGITUDINAL WAVES IN ION BEAM-PLASMA INTERACTION.
by B. D. Fried, and A. Y. Wong. Aug 65, 31p R-2
Grant NGR-05-007-066
NASA-CR-69377

Descriptors: *Longitudinal wave, *Ion beam, *Plasma-particle interaction.

N66-15738 **Field 20I**
CFSTI Prices: HC$2.00 MF$0.50
Institute of Plasma Physics, Nagoya Univ. (Japan).
COLLISION-INDUCED INSTABILITY IN A MAGNETOACTIVE PLASMA.
by K. Mitani, N. Shimomura, and S. Tanaka. Nov 65, 37p IPPJ-43

Descriptors: *Electromagnetic wave, *Electron collision, *Wave propagation, *Magnetoplasma, *Plasma dispersion.

N66-15785 **Field 20I**
CFSTI Prices: HC$2.00 MF$0.50
Inst. of Plasma Physics, Nagoya Univ. (Japan).
NON-LINEAR MOTION OF TWO ION STREAMS IN A BACKGROUND OF HIGH TEMPERATURE ELECTRONS.
by A. Outi, T. Taniuti, and N. Yajima. Oct 65, 29p IPPJ-41

Descriptors: *Wave propagation, *Plasma wave, *Shock wave propagation.

N66-15976 **Field 20I**
CFSTI Prices: HC$1.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Fluid Mechanics Lab.
PROBLEMS IN J TIMES B PLASMA ACCELERATION.
Semiannual progress rept.
by J. A. Fay. 1 Jan 66, 13p
Grant NGR-22-009-052
NASA-CR-69659

Descriptors: *Boundary layer, *Shock tunnel, *Accelerator, *Heat transfer.

N66-16091 **Field 20I**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration. Moffett Field, Calif. Ames Research Center.
MEASUREMENTS OF RESONANT CHARGE EXCHANGE CROSS SECTIONS IN NITROGEN AND ARGON BETWEEN 0.5 AND 17 E V.
by B. J. Nichols, and F. C. Witteborn. Feb 66, 36p
NASA-TN-D-3265

Descriptors: *Argon, *Resonance charge exchange, *Ionization cross section, *Nitrogen.

N66-17261 **Field 20I**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration. Greenbelt, Md. Goddard Space Flight Center.
RELATIVISTIC CHARGED FLUID FLOW. II. GENERALIZED LARMOR AND HELMHOLTZ THEOREMS.
by L. A. Schmid. Oct 65, 45p NASA-TM-X-55389, X-641-65-421

Descriptors: *Electromagnetic field, *Gravitational field, *Fluid, *Relativity theory.

N66-17353 **Field 20I**
CFSTI Prices: HC$4.00 MF$0.75
Case Inst. of Tech., Cleveland, Ohio.
A MEASUREMENT OF ENERGETIC TEST ELECTRON INTERACTIONS WITH A PLASMA.
Doctoral thesis.
by W. B. Johnson, and M. R. Smith. Jun 65, 116p A-38
Grant NsG-198
NASA-CR-70388

Descriptors: *Electron beam, *Plasma-particle interaction, *Energy dissipation, *High temperature plasma.

N66-18058 **Field 20I**
CFSTI Prices: HC$2.00 MF$0.50
Institute of Nuclear Research, Warsaw (Poland).
A NEW DERIVATION OF KINETIC EQUATION FOR AN INHOMOGENEOUS PLASMA.
by A. Kuszeli. Mar 65, 30p INR-616/IXA/PP

Descriptors: *Liouville equation, *Nonuniform plasma, *Kinetic equation.

N66-18066 **Field 20I**
CFSTI Prices: HC$3.00 MF$0.50
Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
ADDITIONAL STUDY AND FURTHER DEVELOPMENT OF THE TRACER-SPARK TECHNIQUE FOR FLOW-VELOCITY MEASUREMENTS.
Semiannual progress rept. no. 3.
by J. B. Kyser. Dec 65, 58p
Grant NsG-620
NASA-CR-70527

Descriptors: *Electron energy, *Spark, Tracer, *Velocity measurement, *Flow velocity.

N66-18322 **Field 20I**
CFSTI Prices: HC$1.00 MF$0.50
Avco-Everett Research Lab., Everett, Mass.
PLASMA RADIATION SHIELDING.
Quarterly progress rept. Jun-Aug 65.
Sep 65, 16p
Contracts NASw-1101, AF 49 (638)-1553
NASA-CR-70634

Descriptors: *Electron plasma, *Magnetic induction, *Voltage amplifier, *Filament.

AD-469 822 **See Field 14B**

AD-470 737 **See Field 20D**

AD-635 760 **See Field 7D**

AD-635 779 **See Field 18A**

AD-635 874 **See Field 20N**

AD-636 090 **See Field 20E**

AD-636 096 **See Field 20N**

AD-636 138 **See Field 4A**

AD-636 149 **See Field 20L**

AD-636 215 **See Field 9E**

AD-636 216 **See Field 9E**

N66-11634 **See Field 20D**

PB-169 963 **See Field 12A**

20J. QUANTUM THEORY

AD-635 618 **Field 20J**
CFSTI Prices: HC$4.00 MF$0.75
Carnegie Inst. of Tech., Pittsburgh, Pa. Dept. of Physics.
COMPLETE NUMERICAL SOLUTION OF BOHR'S COLLECTIVE HAMILTONIAN.
Technical rept.
by Krishna Kumar, and Michel Baranger. Jun 66, 104p TR-24
Contract Nonr-760 (15)
Proj. NR-024-439
Prepared in cooperation with Michigan State Univ., East Lansing. Contract AT (11-1)-1051.

Descriptors: (*Hamiltonian, *Numerical methods and procedures), Quadrupole moments, Wave functions, Potential theory, Vibration, Nuclei.

The general form of Bohr's collective Hamiltonian for quadrupole deformations is reviewed. It contains seven largely arbitrary functions of beta and gamma, the potential energy and six inertial functions. A thorough discussion is given of the symmetries of these seven functions and of the corresponding properties of the solutions of the Schrodinger equation. A purely numerical method involving a finite mesh is developed for solving this Schrodinger equation. The output of the calculation consists in the low-lying levels, the corresponding wave functions, and the relevant E2 and M1 static and transition moments; the latter depend on the intrinsic quadrupole moments and intrinsic gyromagnetic ratios as functions of beta and gamma. The numerical method is tested on a number of examples and is found to be sufficiently accurate for application to spherical, transition, and many deformed nuclei. (Author)

AD-635 830 **Field 20J, 7D**
CFSTI Prices: HC$1.00 MF$0.50
Soreq Research Establishment, Israel Atomic Energy Commission, Yavneh.
THE OPERATOR FOR SPIN FORBIDDEN TRANSITIONS.
by Robert Englman. Dec 65, 14p Scientific-2
Contract AF 61 (052)-806
AFCRL-66-386

Descriptors: (*Electron transitions, Operators (Mathematics)), (*Selection rules, Operators (Mathematics)), Nuclear spins, Electric moments, Dipole moments, Probability, Hamiltonian, Israel.

It is shown that the use of the dipole moment operator to calculate probabilities of transitions with change of spin gives results in many cases correct to within 1 to 1/100 of a percent. The matrix element of the operator is between the large components of spinors. (Author)

AD-635 949 **Field 20J**
CFSTI Prices: HC$5.00 MF$1.00
Lehigh Univ., Bethlehem, Pa.
STUDIES IN THE RELATIVISTIC THEORY OF INTERACTING PARTICLES.
Final technical rept.
by Peter Havas. Apr 66, 170p
Contract AF 33 (615)-1056
Proj. AF-7114
ARL-66-0038
Various publications prepared under this Contract are included.

Descriptors: (*Relativity theory, *Particles), Motion, Gravity, Elementary particles, Approximation (Mathematics), Partial differential equations, Equations of motion, Transformations (Methematics), Tensor analysis, Field theory, Algebraic topology.

Identifiers: Affine spaces, Causality principle, Particle interactions.

The research covered two major areas of investigation: (1) the problem of motion in general relativity, and (2) solutions of relativistic equations and their interpretation. The various topics treated in these areas are described briefly; some applications of the results obtained and possible directions of future research on their basis are briefly discussed. Reproductions of those publications prepared under the contract which were available at the time of preparation of the final report are included. (Author)

AD-636 063 **Field 20J**
CFSTI Prices: HC$1.00 MF$0.50
Queens Coll. of the City Univ. of New York, Flushing. Dept. of Physics.
EQUATIONS OF MOTION OF A DYNAMICAL SYSTEM OF PARTICLES.
Technical rept.
by A. L. Harvey. 1 Jul 66, 8p TR-1
Grant Nonr (G)-00036-66

Descriptors: (*Particles, *Equations of motion), Algorithms, Hamiltonian, Charged particles, Relativity theory.

The equations of motion of a dynamical system are discussed in terms of the initial data. The point of view emphasized is that the initial data are explicitly time dependent constants of the motion, knowledge of which constitutes, implicitly, a complete solution of the equations. A general algorithm for constructing the set of constants in this form and from it, the complete solution, is given. The algorithm provides a complete, formal solution for the dynamical equations in terms of the Hamiltonian function. (Author)

N66-18091 **Field 20J**
CFSTI Prices: HC$1.00 MF$0.50
Institute of Nuclear Research, Warsaw (Poland).
THE SU (2)-SU (3) CONTENT OF THE SU (6) REPRESENTATIONS.
by M. Grynberg, and M. Pindor. Apr 65, 18p
INR-623/VII/PH

Descriptors: *Matrix algebra, *Symmetry, *Unitarity, *Theoretical physics.

For abstract, see T 66 17.

N66-18121 **Field 20J**
CFSTI Prices: HC$1.00 MF$0.50
Laboratoire de Physique Theorique et Des Hautes Energies, Orsay (France).
SOME SIMPLE REMARKS ABOUT THE SCATTERING BY A THREE-BODY POTENTIAL.
by J. Y. Pasquier. Jan 66, 12p TH/122

Descriptors: *Quantum mechanics, *Theoretical physics, *Three-body problem, *Wave function.

AD-635 689 **See Field 12A**

UCRL-16768 **See Field 20H**

20K. SOLID MECHANICS

AD-469 187 **Field 20K, 14B**
CFSTI Prices: HC$3.00 MF$0.75
Florida Univ., Gainesville. Dept. of Engineering Science and Mechanics.
DIGITAL SIMULATION OF RANDOM VIBRATIONS.
by Donald J. Belz. Jun 65, 66p
Grant AF-AFOSR-675-64
Proj. AF-9782
Task 978201
AFOSR-65-0608

Descriptors: (*Structures, Vibration), (*Vibration, Simulation), Digital computers, Beams (Structural), Elasticity, Damping, Statistical functions, Equations, Motion, Statistical distribution, Nonlinear systems, Numerical analysis, Numerical methods and procedures, Pseudo-random systems, Load distribution, Loading (Mechanics).

A physically realizable stationary, Gaussian, random load is simulated digitally and employed as the forcing function in the equation of motion of a damped, elastic beam whose resistance to deformation is due to bending and stretching. The power residue method for generating pseudo-random numbers is employed in the technique presented for constructing the random function, whose statistical properties correspond closely to those of pressure signals measured in the noise field of a turbulent, subsonic air jet. The nonlinear equation of motion is solved in finite-difference form with a forcing function representing a time-random concentrated load applied transversely at midspan. From numerical solutions, statistical measures of response at midspan and at the quarter points of the beam are computed. (Author)

AD-635 594 **Field 20K, 11F, 14B**
CFSTI Prices: HC$1.60 MF$0.50
Cornell Univ., Ithaca, N. Y. Dept. of Engineering Mechanics and Materials.
CALIBRATION OF THE ELECTRIC RESISTANCE METHOD OF STUDYING CRACK PROPAGATION.
Technical memo.
by H. H. Johnson. Mar 62, 12p TM-205
Contract Nonr-3286 (01)
Proj. NRL-62-R05-19A

Descriptors: (*Test methods, Fracture (Mechanics)), (*Fracture (Mechanics), Test methods), (*Resistance (Electrical), Fracture (Mechanics)), Voltage, Propagation, Experimental data, Graphics, Steel, Sheets, Calibration.

An experimental calibration was obtained for the potential difference across a crack in high strength sheet steels. Two theoretical calibrations were worked out. In contrast with the corresponding elasticity problem, a solution which approximates the slot and crack as an ellipse of constant semi-minor axis yields the best agreement with experiment. (Author)

AD-635 644 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
DYNAMIC STABILITY OF A THIN CYLINDER UNDER RADIAL PRESSURE.
by T. C. Fan. Jun 66, 47p RM-4583-PR
Contract AF 49 (638)-1700

Descriptors: (*Structural shells, Cylindrical bodies), (*Dynamics, Structural shells), Buckling (Mechanics), Stability, Perturbation theory, Pressure.

A study is made of how a cylinder behaves when it is subjected to a transient external pressure. In this memorandum, only the instability of the cylinder is examined. This is termed dynamic stability, since the loading is time-dependent. The motions in the three principal directions of a cylinder are purposely considered together to see the influence of their interaction on the mode of failure, compared to earlier work for a single motion. The results show that the mode of failure varies with geometry, numbers of buckle waves for a given loading, and material selected. The influence of the loading rate is also studied. (Author)

AD-635 650 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Army Materials Research Agency, Watertown, Mass. Materials Engineering Div.
EDGE CRACK IN A SEMI-INFINITE SHEET BY POWER SERIES.
by Oscar L. Bowie, and James J. McLaughlin. Jun 66, 11p
Proj. DA-1P014501B33A
Task 36912
AMRA-TR-66-16

Descriptors: (*Elasticity, *Notch sensitivity), (*Sheets, Fracture (Mechanics)), (*Power

series, Elasticity), Numerical analysis, Stresses.

A power series procedure developed for solving the plane elastic problem for edge notches in a semi-infinite sheet is considered when cracks occur in the notch boundary. The resulting mathematical singularities are considered for the illustrative problem of an edge crack in a semi-infinite sheet. Numerical agreement with Koiter's solution is found in an effective manner. (Author)

AD-635 777 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
ELASTIC VIBRATIONS OF A CYLINDRICAL SHELL FILLED WITH LIQUID.
by I. E. Shashkov. 16 Feb 66, 12p ATD-66-16
Proj. 6040101
TT-66-61788
Ob Uprugikh Kolebaniyakh Tsilindricheskoi Obolochki, Napolnennoi Zhidkostyu, trans. of Inzhenernyi Zhurnal (USSR) v5 n3 p575-9 1965.

Descriptors: (*Cylindrical bodies, Vibration), (*Structural shells, *Vibration), Elasticity, Liquids, Flutter, Frequency, Stability, Equations, USSR.

Contents: Rayleigh-Nikolai problem: : On the flutter of a cylindrical shell containing a liquid; On the dynamical stability of a cylindrical shell filled with a liquid.

AD-635 789 **Field 20K, 1B**
CFSTI Prices: HC$2.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
PROPAGATION OF HARMONIC WAVES IN COMPOSITE CIRCULAR CYLINDRICAL SHELLS. PART I. THEORETICAL INVESTIGATION.
Research rept.
by Anthony E. Armenakas. May 66, 32p PIBAL-924
Contract Nonr-839 (40) (FBM)
Proj. NR-064-427

Descriptors: (*Structural shells, *Elasticity), Mechanical waves, Propagation, Theory, Cylindrical bodies.

In this investigation, the propagation of harmonic waves of an arbitrary number of circumferential nodes travelling in composite, traction-free, circular cylindrical shells, is studied on the basis of the linear, three-dimensional theory of elasticity. The composite shells consist of a circular inner layer composed of one material, bounded by and bonded to a circular outer casing made of another material. (Author)

AD-635 802 **Field 20K**
CFSTI Prices: HC$3.00 MF$0.50
Pennsylvania State Univ., University Park. Dept. of Engineering Mechanics.
STRESS CONCENTRATION AROUND SPHERICAL CAVITIES IN STRAIN-GRADIENT DEPENDENT ELASTIC BODIES SUBJECTED TO UNIAXIAL TENSION.
Technical rept.
by Glenn A. Hazen, and Yechiel Weitsman. Jul 66, 53p TR-4
Contract Nonr (G)-00040-65
Proj. NR-064-488

Descriptors: (*Elasticity, *Boundary value problems), Stresses, Strain (Mechanics), Spheres, Potential theory.

This paper presents an analytical solution to a boundary-value problem in linear elasticity where potential energy depends on strains and strain gradients. The problem considered is that of an infinite medium, containing a spherical cavity, subjected to uniaxial tension at infinity. Special attention is given to the stress concentration factor at the surface of the cavity and to some higher order stress-terms. Results show that the stress concentration factor, which depends on two characteristic lengths as well as on additional material parameters, can exceed the classical value. The hyperstresses are found to represent surface like phenomena; they dimish to zero away from the surface of the cavity. (Author)

AD-635 808 **Field 20K, 14B, 20A, 1C K**
CFSTI Prices: HC$4.00 MF$1.00
IIT Research Inst., Chicago, Ill.
THEORETICAL AND EXPERIMENTAL MODEL INVESTIGATIONS OF SEMI-ANECHOIC AND SEMI-REVERBERANT ENVIRONMENTS AND THEIR APPLICATION TO THE RTD SONIC FATIGUE FACILITY.
Final rept. 15 Nov 64-15 Mar 66.
by David F. Pernet, and Gale R. Hruska. Apr 66, 156p
Contract AF 33 (615)-2174
Proj. AF-4437
Task 443701
AFFDL-TR-66-20

Descriptors: (*Sonic fatigue, Test facilities), Airframes, Fatigue (Mechanics), Anechoic chambers, Models (Simulations), Acoustic equipment, Noise, Environment.

A study of the acoustic environments that could be produced in the RTD Sonic Fatigue Facility was made using both theoretical methods and experimental modeling techniques. An analysis is presented which enables the semi-anechoic environment to be determined at any position in the facility. This analysis is verified experimentally. An experimental program also enabled the semi-reverberant environment to be established and revealed the part played by the absorbing treatment in determining this environment. Experimental programs investigated the sound fields on structures located in the facility under both modes of operation. A study of reflector devices used to modify acoustic environments was made and enabled limited prediction of their effects. An analysis of current service noise fields on aircraft structures enabled determination of values of the major parameters of these fields to be determined for use in simulation studies. (Author)

AD-635 837 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
APPROXIMATE YIELD CONDITIONS FOR ROTATIONAL SHELLS UNDER AXISYMMETRIC LOADING.
by Chuh Sheng Nien. 17 May 66, 30p FTD-tt-65-1745
TT-66-61796
Edited trans. of Li Hsueh Hsueh Pao (Chinese People's Republic) v7 n1 p12-28 1964.

Descriptors: (*Structural shells, *Mechanical properties), Loading (Mechanics), Bodies of revolution, USSR.

For abstract, see T 66 17.

AD-635 853 **Field 20K, 20M**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
ON THERMAL FATIGUE.
by N. D. Sobolev. 25 May 66, 17p FTD-TT-65-1697
TT-66-61800
Unedited rough draft trans. of mono. Voprosy Mekhanicheskoi Ustalosti, Moscow, 1964 p211-9.

Descriptors: (*Fatigue (Mechanics), Thermal stresses), Stresses, Deformation, Numerical analysis, Steel, Thermal properties, USSR.

The procedure for testing for thermal fatigue should provide the possibility for variation in the deformations within wide ranges, and the study of the conformity to law in thermal fatigue should be done with the separation of the influence of the thermal and mecha ical factors. It was established that the individual features of the process of deformation do not have an influence in the formation of breakdown cracks. The breakdown from thermal fatigue under different stress states is described by the energy criterion. A relative evaluation of the resistance of materials to thermal fatigue can be done with the aid of approximation criteria.

AD-635 940 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Aerospace Engineering and Applied Mechanics.
DYNAMIC RESPONSE OF ORTHOTROPIC PLASTIC CYLINDRICAL SHELLS UNDER RADIAL PRESSURES.
Research rept.
by B. Venkatraman, and Sharad A. Patel. Mar 66, 19p PIBAL-914
Contract Nonr-839 (40)FBM
Proj. NR-064-427

Descriptors: (*Cylindrical bodies, Stresses), (*Structural shells, Stresses), Dynamics, Pressure, Plastics, Loading (Mechanics), Deflection, Strain (Mechanics).

The dynamic response of orthotropic circular cylindrical shells subjected to exponentially decaying uniform radial pressures is considered. The initial values of the pressures applied are slightly larger than the corresponding static collapse pressures of the shells obtained on the basis of Trescas yield criterion. The maximum kinematically admissible deflections for a cantilever shell as well as a shell clamped at both ends are presented for various values of the shell parameter. (Author)

AD-636 187 **Field 20K, 13M**
CFSTI Prices: HC$5.00 MF$1.00
Illinois Univ., Urbana. Dept. of Civil Engineering.
ANALYSIS OF CIRCULAR CYLINDRICAL SHELLS CONTAINING RECTANGULAR OPENINGS WITH STIFFENED EDGES.
Technical rept.
by R. E. Pinckert, and W. C. Schnobrich. Jun 66, 155p Structural Research Ser-308
Contract Nonr-1834 (03)
Proj. NR-064-183

Descriptors: (*Structural shells, *Elastic shells), Models (Simulations), Beams (Structural), Numerical analysis.

In this study, a discrete element physical analogue model is developed for the analysis of elastic cylindrical shells containing rectangular openings. Reinforcing edge beams about the perimeters of the openings are considered. The model is a rectangular framework of weightless rigid bars connected by deformable nodes. Solutions are found for this network which approximates the shell continuum. The physical properties of the replaced shell are considered concentrated at the nodes. The displacements u, v and w of the shell in the longitudinal, transverse and radial directions, respectively, are defined at the junctions of the rigid bars. Expressions for the membrane forces and bending moments in the shell are given in terms of the displacements. Using the principle of virtual work, equilibrium equations are developed at each node point in terms of the unknown displacements. The resulting set of linear simultaneous equations is solved for these displacements. Forces and moments in the shell can then be obtained from the force-displacement relations. The edge beams which stiffen the shell at the openings are symmetrical in reference to the middle surface of the shell. Edge beam internal torsion, bending moments, and axial forces are taken into account in the equilibrium equations. Numerical results are presented for representative shell problems in which the size and type of the shell, dimensions of the holes, stiffnesses of the edge beams, and types of loading are varied. (Author)

AD-636 192 Field 20K, 11B
CFSTI Prices: HC$2.00 MF$0.50
Utah Research and Development Co., Inc., Salt Lake City.
THEORETICAL AND EXPERIMENTAL STUDY OF LOW-VELOCITY PENETRATION PHENOMENA.
Semiannual rept.
by Emerson T. Cannon. Dec 65, 33p
Contract DA-19-129-AMC-150 (X)
See also AD-633 476.

Descriptors: (*Impact prediction, Penetration), (*Viscoelasticity, Impact prediction), Velocity, Theory, Mathematical models, Materials.

Progress is reported on the development of a computer code for describing the flow field during impact of solid on solid. A one-dimensional material model is used consisting of isolated mass points connected by springs with highly non-linear spring constants and viscous damping. The spring constant is derived from shock Hugoniot equation-of-state work and the viscosity comes from measurements of the energy involved in crushing discs of the material used. So far, aluminum has been the only material tested in the computer program. The results of varying the predictor/corrector scheme used to stablize the solution and the results by varying viscosity are presented. It is shown that the solution gives the correct pressure jump across a shock front and gives correct wave velocities. Some oscillations and propagation of error are present. Methods of improving this are discussed. A rod-to-rod impact experiment is described for measuring the maximum pressure gradient which a material can sustain under dynamic impact conditions. The method is suitable for measuring material-strength properties for brittle materials which are not suited to the disc-crushing experiments previously used. Results are presented for nylon, polypropylene, plexiglass, Benelex, and glass. The plastics show a maximum pressure gradient, then a leveling off as impact velocity is increased. Glass increases continually up to the maximum velocities tested. Further work to increase the pressure used in the tests and to investigate geometric effects is outlined. (Author)

AD-636 271 Field 20K, 16D, 11I
CFSTI Prices: HC$4.00 MF$1.00
Nortronics, Newbury Park, Calif. Applied Research Dept.
SHOCK PROPAGATION IN SOLIDS AND FOAMS AND STUDIES OF NON-HYDRODYNAMIC ATTENUATION (EXPERIMENTAL DATA TO IMPROVE THEORY).
Final rept., 1 Jul 65-28 Feb 66.
by Donald V. Keller. 30 Mar 66, 149p ARD-66-31R
Contract DA-01-021-AMC-90022 (Y)

Descriptors: (*Shock waves, Propagation), (*Expanded plastics, Shock waves), (*Composite materials, Shock waves), Phenolic plastics, Carbon, Loading (Mechanics), Equations of state, Solids, Attenuation, Acrylic resins, Tungsten, Nose cones, Materials.

Two problems were studied. These were (1) the Hugoniot equation of state of carbon phenolic with two different initial internal energies and (2) the effectiveness of polyurethane foams in reducing peak pressures induced in plate slap experiments. Measurements were performed on unheated samples of carbon phenolic at 23o and on preheated samples at 150o; attenuation rate of shock waves traversing the material and the tension at which the material failed were determined at the two temperatures. In addition several series of experiments were carried out to investigate the phenomenon of non-hydrodynamic attenuation. (Author)

N66-12243 Field 20K
CFSTI Prices: HC$2.00 MF$0.50
California Univ., Los Angeles. Dept. of Engineering.
OPTIMUM DESIGN OF CORRUGATED WIDE COLUMNS.
by M. H. Magie, and C. H. Steinberg. Sep 65, 36p 65-37
Grant NsG-423
NASA-CR-68103

Descriptors: *Corrugation, *Optimization, *Column, *Failure mode.

For abstract, see T 66 17.

N66-12245 Field 20K
CFSTI Prices: HC$4.00 MF$0.75
Northrop Space Labs., Huntsville, Ala. Research and Analysis Section.
DYNAMIC STABILITY OF A FLEXIBLE BOOSTER SUBJECTED TO A GIMBLED, PERIODICALLY-VARYING END THRUST.
Technical memor.
by J. L. Hill, G. C. Kao, J. H. Kincaid, A. D. Merville, and C. M. Pearson. Oct 65, 113p E20-118, TM-104
Contract NAS8-11255
NASA-CR-68104

Descriptors: *Rocket booster, *Thin walled shell, *Structural dynamics, *Variable thrust.

N66-13158 Field 20K
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
FORCED FLEXURAL MOTION OF A ROCKET-BOOSTED VEHICLE.
by R. A. Anderson. 3 Sep 62, 22p JPL-TM-33-147
Contract NAS7-100
NASA-CR-68534

Descriptors: *Bending vibration, *Rocket booster, *Structural dynamics, *Thrust vector control (TVC).

N66-13173 Field 20K
CFSTI Prices: HC$3.00 MF$0.75
West Virginia Univ., Morgantown.
INVESTIGATION OF THE CONSTITUTIVE EQUATIONS FOR MULTI-PHASE HYPOELASTIC MATERIALS.
Final rept. 1 Jun 64-1 Sep 65.
by R. D. Snyder. 1965, 93p
Grant NsG-533
NASA-CR-68457

Descriptors: *Elastic medium, *Hypoelasticity, *Heterogeneity, *Materials science.

N66-14632 Field 20K
CFSTI Prices: HC$5.00 MF$1.00
Northrop Space Labs., Huntsville, Ala. Research and Analysis Section.
FORTRAN IV COMPUTER PROGRAM FOR THE EVALUATION OF NATURAL FREQUENCIES AND UNSTABLE VALUES OF THE THRUST FREQUENCY FOR A FREE-FREE, CIRCULAR CYLINDRICAL SHELL SUBJECTED TO A GIMBALED, PERIODICALLY-VARYING END THRUST.
Technical memo.
by J. H. Kincaid, A. D. Merville, and C. M. Pearson. Sep 65, 155p TM-124, E20-141
Contract NAS8-11255
NASA-CR-69111

Descriptors: *Cylindrical shell, *Fortran, *Natural frequency, *Circular cylinder, *Thrust.

N66-15175 Field 20K
CFSTI Prices: HC$7.00 MF$2.00
Martin Co., Denver, Colo.
COMPILATION OF SHOCK, VIBRATION, AND ACOUSTIC DATA FROM TITAN VEHICLES. VOLUME III- TITAN II SHOCK, VIBRATION, AND ACOUSTIC DATA.
Jan 65, 399p
Contract NAS1-4312
NASA-CR-62002, NASA-CR-64-86 VOL 3

Descriptors: *Shock, *Acoustic vibration, *Titan II ICBM, *Vibration measurement.

N66-15388 Field 20K
CFSTI Prices: HC$3.00 MF$0.75
Technik, Inc., Jericho, N. Y.
HYPERVELOCITY IMPACT. A SERIES SOLUTION. PART II. SPHERICAL FLOW.
by P. Marnell, and M. Zaid. Jun 65, 82p TR-65-16
Contract NAS1-2622
NASA-CR-66048

Descriptors: *Flow field, *Hugoniot equation of state, *Penetrating particle, *Hypervelocity impact.

N66-15403 Field 20K
CFSTI Prices: HC$2.00 MF$0.50
Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.
A SET OF SIMPLE, ACCURATE EQUATIONS FOR CIRCULAR CYLINDRICAL ELASTIC SHELLS.
by J. G. Simmonds. 1964, 43p
Grant NsG-559
NASA-CR-66028

Descriptors: *Circular shell, *Cylindrical shell, *Edge loading, *Partial differential equation, *Structural dynamics.

N66-15419 Field 20K
CFSTI Prices: HC$1.00 MF$0.50
Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering.
TORSIONAL INSTABILITY OF CANTILEVERED BARS SUBJECTED TO NONCONSERVATIVE LOADING.
by G. Herrmann, and S. Nemat-Nasser. 1964, 25p
Grant NsG-605
NASA-CR-57217

Descriptors: *Cantilever beam, *Compression loading, *Torsional stress, *Structural stability.

N66-15423 Field 20K
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Berkeley. Structures and Materials Research.
EDGE DISTURBANCES IN AXISYMMETRICAL SHELLS OF REVOLUTION.
by Z. A. Lu, and E. P. Popov. Sep 64, 18p SESM-64-3
Grant NsG-274-62
NASA-CR-60321

Descriptors: *Stress analysis, *Structural dynamics, *Axisymmetric body, *Body of revolution, *Edge loading.

N66-15442 Field 20K
CFSTI Prices: HC$1.00 MF$0.50
Lehigh Univ., Bethlehem, Pa. Inst. of Research.
EFFECT OF SPACEWISE VARIATIONS IN A RANDOM LOAD FIELD ON THE RESPONSE OF A LINEAR SYSTEM.
by F. P. Beer, and R. J. Ravera. 1 Aug 65, 25p
Grant NsG-466
NASA-CR-69386

Descriptors: *Linear system, *Random load, *Statistical mechanics.

N66-15588 Field 20K
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Berkeley.
STRESSES AND DEFORMATIONS IN THIN SHELLS OF REVOLUTION.
Progress rept. no. 7.

by J. Penzien, and E. P. Popov. 30 Dec 65, 18p
Grant NsG-274
NASA-CR-69436

Descriptors: *Circular plate, *Thin walled shell, *Bending, *Dynamic response, *Loading.

N66-15594 Field 20K
CFSTI Prices: HC$3.00 MF$0.75
Bolt, Beranek, and Newman, Inc., Los Angeles, Calif.
A WIND TUNNEL INVESTIGATION OF PANEL RESPONSE TO BOUNDARY LAYER PRESSURE FLUCTUATIONS AT MACH 1.4 AND MACH 3.5.
by D. A. Bies. Oct 65, 90p Rept. no. 1264
Contract NASw-932
NASA-CR-69444

Descriptors: *Acoustic stability, *Boundary layer flow, *Structural stability.

N66-15617 Field 20K
CFSTI Prices: HC$1.00 MF$0.50
TRW Systems Group, Redondo Beach, Calif. Physical Electronics Lab.
PENETRATION OF THIN FILMS BY HYPERVELOCITY MICROPARTICLES.
by J. F. Friichtenicht. Jul 65, 9p STL-4158-6013-TU-000
Contract NASw-936
NASA-CR-69481

Descriptors: *Microparticle, *Hypervelocity impact, *Penetration, *Thin film.

N66-15972 Field 20K
CFSTI Prices: HC$4.00 MF$1.00
AVCO Corp., Nashville, Tenn. Aerospace Structures Div.
ULTRALIGHT HONEYCOMB DEVELOPMENT FOR S-II STAGE IMPROVEMENT.
Final rept.
by P. E. Pigue. 19 Oct 65, 129p R-1050
Contract NAS8-11807
NASA-CR-69651

Descriptors: *Sandwich construction, *Saturn S-II stage, *Bonding, *Honeycomb core, *Titanium.

N66-16055 Field 20K
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Huntsville, Ala. George C. Marshall Space Flight Center.
BLAST EFFECTS ON SPACE VEHICLE STRUCTURES.
by R. Niemi, and R. Rabenau. Feb 66, 67p
NASA-TN-D-2945

Descriptors: *Spacecraft structure, *Blast pressure, *Flight instrument, *Structural stability.

N66-16059 Field 20K
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
STRESS-INTENSITY FACTORS BY BOUNDARY COLLOCATION FOR SINGLE-EDGE-NOTCH SPECIMENS SUBJECTS TO SPLITTING FORCES.
by B. Gross, and J. E. Srawley. Feb 66, 12p
NASA-TN-D-3295

Descriptors: *Crack formation, *Stress measurement, *Boundary value problem, *Force.

N66-16154 Field 20K
CFSTI Prices: HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE JPL HIGH-IMPACT PROGRAM - 1965.
by J. L. Adams. 1 Feb 66, 33p JPL-TR-32-844
Contract NAS7-100
NASA-CR-69919

Descriptors: *Electromechanical device, *Impact tolerance, *Landing speed.

N66-17356 Field 20K
CFSTI Prices: HC$5.00 MF$1.00
Ryan Aeronautical Co., San Diego, Calif.
DEPLOYABLE LARGE AREA SOLAR ARRAY STRUCTURE PRELIMINARY DEVELOPMENTAL REPORT, PHASE I.
30 Jul 65, 163p Rept. no. 20869-1
Contract NAS7-100
NASA-CR-70377

Descriptors: *Actuator, *Solar cell, *Structural design.

N66-17734 Field 20K
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
INVESTIGATION OF THE IMPACT OF HIGH-FINENESS-RATIO PROJECTILES INTO THICK TARGETS.
by B. P. Denardo, and C. R. Nysmith. Mar 66, 14p NASA-TN-D-3304

Descriptors: *Fineness ratio, *Penetration ballistics, *Projectile penetration, *Impact test.

N66-17890 Field 20K
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
EXPERIMENTAL INVESTIGATION TO DETERMINE UTILITY OF TENSION SHELL CONCEPT.
by W. J. Stroud, and G. W. Zender. Mar 66, 14p

Descriptors: *Conical shell, *Membrane theory, *Planetary entry, *Tension.

N66-18414 Field 20K
CFSTI Prices: HC$1.00 MF$0.50
Southwest Research Inst., San Antonio, Tex.
FURTHER STUDIES OF LIQUID SLOSHING IN ROCKET PROPELLANT TANKS.
Final rept. 25 Mar 61-31 Dec 65.
by H. N. Abramson. Dec 65, 25p
Contract NAS8-1555
NASA-CR-70514

Descriptors: *Ring structure, *Rocket propellant tank, *Structural design, *Liquid sloshing.

N66-18469 Field 20K
CFSTI Prices: HC$3.00 MF$0.75
General Dynamics/Astronautics, San Diego, Calif.
DATA FOR THE DETERMINATION OF ALLOWABLE BURST STRESSES FOR THIN-WALLED CYLINDRICAL PRESSURE VESSELS.
by F. A. Piscopo. 19 Jul 63, 68p Rept. no. 55E-799
Contract NAS3-3232
NASA-CR-54488

Descriptors: *Burst, *Cylindrical shell, *Pressure vessel, *Stress rupture, *Thin walled shell.

N66-18475 Field 20K
CFSTI Prices: HC$2.00 MF$0.50
General Dynamics/Convair, San Diego, Calif.
TRANSONIC BUFFETING OF THE CENTAUR INTERSTAGE ADAPTER.
by R. R. Mitchell. 19 Nov 63, 34p GD/A-63-1204
Contract NAS3-3232
NASA-CR-54510

Descriptors: *Centaur launch vehicle, *Cylindrical shell, *Random vibration, *Transonic flight, *Buffeting.

N66-18481 Field 20K
CFSTI Prices: HC$3.00 MF$0.50
General Dynamics/Convair, San Diego, Calif.
COMPARATIVE TENSILE AND FATIGUE PROPERTIES AT ROOM TEMPERATURE AND AT MINUS 423 DEG F OF SOME WELDED CENTAUR TANK JOINT CONFIGURATIONS.
by R. S. Gill. 11 Oct 63, 54p GD/A-63-1019
Contract NAS3-3232
NASA-CR-54689

Descriptors: *Load test, *Tank, *Fatigue test, *Stainless steel, *Welded joint.

AD-409 123 See Field 21I

AD-474 719 See Field 13M

AD-635 675 See Field 13J

AD-635 691 See Field 13M

AD-635 816 See Field 20M

AD-635 878 See Field 20N

AD-636 088 See Field 13M

AD-636 224 See Field 19D

PB-170 445 See Field 14B

20L. SOLID STATE PHYSICS

AD-635 620 Field 20L, 20E
CFSTI Prices: HC$1.00 MF$0.50
Illinois Univ., Urbana. Dept. of Electrical Engineering.
JUNCTION EFFECTS IN COMPOUND SEMICONDUCTORS.
by N. Holonyak Jr, M. D. Sirkis, C. J. Nuese, J. S. Moore, and G. Stillman. Feb 66, 12p Scientific-5
Contract AF 19 (628)-4337
Proj. AF-4608
Task 460805
AFCRL-66-245
See also AD-629 689.

Descriptors: (*Luminescence, Semiconductors), (*Lasers, Semiconductors), (*Semiconductors, Lasers), Gallium alloys, Phosphorous alloys, Arsenic alloys, Synthesis (Chemistry), Preparation, Operation, Carriers (Semiconductors), Silicon, Oscillators, Crystal lattice defects, Impurities.

The current state of progress in the synthesis, junction fabrication, and lamp and laser operation of Ga (As1-xPx) is described. The effect of the considerable depth of donor states near the indirect <100 > conduction band minimum is shown to reduce the high-energy limit (reduces x) of laser operation in Ga (As1-xPx). Silicon p-'i'-n deep-level oscillators are described that operate beyond 100 MHz under dc bias. (Author)

AD-635 653 Field 20L, 7D, 20B
CFSTI Prices: HC$1.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y.
COMPOUNDS WITH DEFECT STRUCTURES.
Progress rept. no. 5, 1 Oct 65-31 Mar 66.
by E. Banks, M. Goldblatt, E. Kostiner, V. Abbruscato, and N. Tashima. 31 Mar 66, 12p
Contract DA-31-124-ARO (D)-71
Proj. DA-20010-501B700

Descriptors: (*Chemical compounds, Solid state physics), (*Manganese compounds, Magnetic properties), (*Ferrites, Crystal growth), (*Phosphates, Atomic structure), (*Ytterbium, Absorption spectrum), Mossbauer effect, Crystal structure, Aluminates, Solid solutions, Fluorides, Substitution reactions, Copper compounds, Spinels, Calcium

compounds, Chlorides, Cadmium compounds, Crystal lattice defects, Ceramic materials.

Crystals in the system Mn2-xFex03 (0<x<1) and Mn1.8A10.203 were grown by anodic electrolysis from tungstate melts. Their reciprocal susceptibility-temperature curves show apparent antiferromagnetic behavior and large negative Weiss constants. A number of fluxes were tried in the effort to obtain large crystals of fluoride-substituted copper ferrite, with the production of small crystals of spinel structure, some of which are tetragonal, and others cubic. Least-squares refinement of the structure of the spodiosite Ca1P04C1 to an R value of 0.043 has led to atomic positions accurate to plus or minus 0.001A for the heavy atoms and plus or minus 0.002A for the oxygens. Further studies of the absorption spectrum of Yb3+in CdF2 were made for the purpose of understanding the appearance of an absorption peak at 977 nm, which disappears as interstitial fluoride ions are replaced by Na (+) as the charge compensator. This peak does not appear in CaF2-Yb (3+), but is present in CdF2 and PbF2.

AD-635 671 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
Columbia Univ., New York. Dept. of Electrical Engineering.
A MECHANISM FOR ENERGY TRANSPORT BY EXCITONS.
Technical rept.
by David Redfield. 1966, 15p TR-93, CU-2-66-Nonr4259 (16)-EE
Contract Nonr-4259 (16)
Proj. NR-017 465

Descriptors: (*Crystal lattice defects, Carriers (Semiconductors)), (*Carriers (Semiconductors), *Transport properties), Electrons, Energy, Diffusion, Photons, Fluorescence, Absorption spectrum.

Identifiers: Excitons.

Detailed consideration of the effects of charged imperfections in solids shows two influences relevant to the question of energy transport associated with excitons. First, such defects create exciton traps, or at least tend to hinder ordinary exciton diffusion. Second, the defects alter the optical absorption in such a way as to provide a new mechanism for energy transport by the photons associated with excitons. (Author)

AD-635 813 **Field 20L, 20C**
CFSTI Prices: HC$3.00 MF$0.50
Rutgers - The State Univ., New Brunswick, N. J.
TIME VARIATION OF THE GINZBURG-LANDAU ORDER PARAMETER.
Technical rept.
by Elihu Abrahams, and Toshihiko Tsuneto. 24 Jun 66, 56p
Contract Nonr-404 (13)
Proj. NR-018-104

Descriptors: (*Superconductivity, Theory), (*Differential geometry, Superconductivity), Green's function, Field theory.

The authors use a non-equilibrium form of the Green's function formulation of the BCS theory of superconductivity to investigate the circumstances under which differential equations in space and time, i.e., 'time dependent Ginzburg-Landau equations', give a valid description of the space and time variation of the order parameter A in superconductors. They find that if the variations are sufficiently slow, time dependent Ginzburg-Landau equations exist near absolute zero and near the transition temperature. In the former case, the equation has wave-like character and in the latter case it is of diffusion type with the restriction that either the characteristic frequency of the time variation of A is greater than the gap frequency or the ratio of the Fermi velocity to the product of the characteristic wave length and frequency of the space-time variation of A is greater than unity. Under all other circumstances and at general temperatures, there are no differential equations to describe the variations of A. (Author)

AD-635 867 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
Soreq Research Estabilishment, Israel Atomic Energy Commission, Yavneh.
ELECTROLUMINESCENCE IN SEMICONDUCTING DIAMOND AND ITS STIMULATION BY INFRARED.
by V. Bar, A. Halperin, and J. Levinson. Apr 66, 12p Scientific-6
Contract AF 61 (052)-759
AFCRL-66-494
To be presented at the International Conference on Luminescence, Budapest, Aug. 1966.

Descriptors: (*Infrared radiation, Diamonds), (*Semiconductors, Electroluminescence), (*Diamonds, *Electroluminescence), Crystals, Excitation, Photoelectric effect, Electric fields, Band theory of solids, Color centers, Israel.

Identifiers: Thermoluminescence.

The blue electroluminescence (EL) of semiconducting diamonds was measured at 80K. It was found to be stimulated by irradiation of the crystal with infrared or visible light. The light-stimulated EL depended linearly on both the light intensity and the current, and its excitation spectra was found to follow that of the photo current. Application of an electric field across the crystal at 80K excited thermoluminescence TL, with the main glow peak at about 270K. Although infrared for itself did not excite TL at all, its application prior or simultaneously with the electric field was found to stimulate the TL. It is suggested that the infrared light raises valence band electrons to an intermediate energy level in the forbidden gap from which they are excited up to the luminescence centers by the electric field. (Author)

AD-635 868 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
Soreq Research Establishment, Israel Atomic Energy Commission, Yavneh.
SUPERLINEAR EXCITATION OF THERMOLUMINESCENCE IN DIAMOND.
by R. Chen, and A. Halperin. Apr 66, 11p Scientific-7
Contract AF 61 (052)-759
AFCRL-66-495
To be presented at the International Conference on Luminescence, Budapest, Aug. 1966.

Descriptors: (*Semiconductors, Luminescence), (*Diamonds, *Luminescence), Crystals, Excitation, Light, Intensity, Ultraviolet radiation, Electrons, Band theory of solids, Israel.

Identifiers: Thermoluminescence.

The thermoluminescence (TL) of semiconducting diamonds and its dependence on the wavelength of the exciting light and on the dose of excitation was investigated. The strongest glow peak appearing at about 250K, was found to rise linearly with the dose on excitation at the absorption edge (225 millimicrons), but showed a strong superlinear effect on irradiation with longer wavelengths (280 - 400 millimicrons). With light near 360 millimicrons this peak was found to rise with the third power of the dose. Illumination with longer wavelengths (500 - 1000 millimicrons) followed by uv (280 - 400 millimicrons) resulted in an enhancement of the TL intensity and a reduction in the power factor of the dependence on the dose, compared to those obtained on illumination with the uv light only. Multistage excitation is proposed to account for the observed superlinearity. The illumination with long wavelengths prior to the uv excitation is assumed to excite electrons to one of the intermediate stages. (Author)

AD-635 978 **Field 20L**
CFSTI Prices: HC$5.00 MF$1.00
International Business Machines Corp., Hopewell Junction, N. Y. Components Div.
MATHEMATICAL INVESTIGATIONS OF SEMICONDUCTOR DEVICES.
Final rept. no. 1, 1 Apr 65-1 Apr 66.
by D. P. Kennedy. Apr 66, 185p TR-22.273
Contract AF 19 (628)-5072
Proj. AF-4608
Task 460805
AFCRL-66-358

Descriptors: (*Semiconductor devices, Mathematical analysis), Impurities, Distribution, Diffusion, Theory, Electrostatics, Space charges, Transistor amplifiers.

A mathematical analysis is presented on the impurity atom distribution with a Small Current Amplifying Device (SCAD). This analysis is in two spatial variables, and it includes the mixed boundary conditions encountered in a paractical semiconductor device. Computer calculated impurity atom distributions are graphically illustrated to show the two-dimensional p-n junction profile obtained in a SCAD when the gate junction is fabricated by a two-step impurity atom diffusion process. From these calculated p-n junction profiles, the present investigation is extended to include avalanche breakdown mechanisms in diffused planar p-n junctions. Unlike previous investigations on this topic, the present analysis takes into consideration junction curvature and its influence upon carrier multiplication within a p-n junction space-charge layer. To further understand SCAD operation, a mathematical investigation is presented on the large current properties of the linearly graded p-n junction. From this analysis, it is shown that classical depletion layer theory provides a relatively inaccurate view of the mechanisms encountered in a forward biased structure. For this reason, before establishing a detailed mathematical theory of SCAD operation, it appears necessary to undertake a similar study on the mechanisms of diffused p-n junction operation. (Author)

AD-636 033 **Field 20L**
CFSTI Prices: HC$2.00 MF$0.50
Army Missile Command, Redstone Arsenal, Ala. Physical Sciences Lab.
THE MOSSBAUER EFFECT.
by Ambuj Mukerji, and C. A. Coulter. 24 Mar 66, 48p
Proj. DA-1L013001A91A
AMC-RA-RR-TR-66-5

Descriptors: (*Mossbauer effect, Theory), (*Fluorescence, Mossbauer effect), Gamma emission, Recoil atoms, Nuclear resonance, Doppler effect, Phonons, Crystal lattices, Quantum mechanics, Nuclear energy levels, Nuclear moments, Crystal lattices defects.

The theory of the nuclear Mossbauer effect and its optical analogue is presented. Introductory paragraphs deal with the destruction of resonance fluorescence in case of a freely recoiling nucleus. The partial restoration of resonance by Doppler effect and thermal broadening is outlined. The concept of zero-phonon transitions between bound nuclear states of nuclei embedded in a crystalline lattice is introduced in a simple quantum mechanical language. The classical derivation of the Debye-Waller factor based on the frequency modulation concept is followed by a rigorous quantum mechanical calculation of the zero-phonon transition probability and its temperature dependence. Lipkin's sum rule is discussed. Application of the Mossbauer effect to determine lifetimes of excited states, nuclear quadrupole moments, and the isomeric shifts is shown. The optical analogue in defect solids is described. (Author)

AD-636 121 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
Carnegie Inst. of Tech., Pittsburgh, Pa.
EXPERIMENTAL STUDY OF THE BAND STRUCTURE IN THE IRON SERIES OF TRANSITION ELEMENTS.

Final rept., Mar 62-Dec 65.
by Emerson M. Pugh, and James A. Dreesen. Dec 65, 5p
Grants DA-ARO (D)-31-124-G278, DA-ARO (D)-31-124-G652
Proj. 3221-P
AROD-3221:14

Descriptors: (*Transition elements, *Band theory of solids), (*Hall effect, Transition elements), Alloys, Magnetostriction, Thermoelectric effect.

Conclusions are stated concerning work involving a survey of the ordinary and extraordinary hall coefficients for elements and alloys having total electrons per atom from 25.7 through 29.

AD-636 149 **Field 20L, 14B, 20I**
CFSTI Prices: HC$4.00 MF$1.00
Toronto Univ., (Ontario). Inst. of Aerospace Studies.
A STUDY OF A NEON CYCLE CRYOGENIC PUMPING SYSTEM FOR A LOW DENSITY PLASMA TUNNEL.
Technical rept.
by J. C. Lafrance. Jul 66, 134p UTIAS-116
Contract Nonr-4073 (00)A-1

Descriptors: (*Cryopumping, Plasma medium), Wind tunnels, Neon, Joule-Thompson effect, Pumps, Refrigeration systems.

This paper describes the development and testing of a large neon cycle cryogenic pump for use with a low density wind tunnel meant for both ionized and non-ionized flows. The development work necessary in the choice of the refrigerant cycle and the production of the required hardware is described in some detail. Once the cryogenic pump was in operation it was thoroughly tested both as a refrigerator system and as a pump. Experimental data on the thermodynamic properties of neon was obtained and found to be in excellent agreement with the available theoretical data. The refrigerator cycle was found to operate satisfactorily and as predicted. The pump itself was found to operate satisfactorily and as predicted over its entire designed range of operation. A pumping rate of 0.8 gr/sec N sub 2 was achieved while maintaining the test section pressure in the 1 - 4 x 0.001 torr region. (Author)

AD-636 163 **Field 20L**
CFSTI Prices: HC$2.00 MF$0.50
Fairchild Semiconductor Div., Fairchild Camera and Instrument Corp., Mountain View, Calif.
RADIATION STUDY ON MOS STRUCTURES.
Scientific rept. no. 1, 15 Dec 65-15 May 66.
by E. H. Snow, and A. S. Grove. Jun 66, 29p
Contract AF 19 (628)-5747
Proj. AF-4608
Task 460805
AFCRL-66-449

Descriptors: (*Semiconductors, Space charges), Ionization, Crystal lattice defects, Metals, Oxides, Photoelectric effect, Photoconductivity, Ultraviolet radiation, X-rays.

Identifiers: MOS.

Ionizing radiation causes the build-up of a positive space-charge within the oxide on an MOS structure. The location of this space-charge and the kinetics of its formation and annealing have been studies experimentally. On the basis of these experiments, a simple model has been proposed which relates this space-charge to the defect structure of the oxide and provides results in good agreement with the data. Photocurrents flowing in the oxide due to X-rays and ultraviolet light have been used in the interpretation of the experiments and have made possible the construction of detailed energy band diagrams of the MOS structure. (Author)

AD-636 257 **Field 20L, 20D, 20C, 10A K**
CFSTI Prices: HC$5.00 MF$1.00
Carnegie Inst. of Tech., Pittsburgh, Pa. Dept. of Mechanical Engineering.
UNCONVENTIONAL METHODS FOR INFLUENCING FLUID FLOW. PART VI. THE EFFECT OF A TRANSVERSE MAGNETIC FIELD ON THE THERMOELECTRIC PROPERTIES OF POLYCRYSTALLINE BISMUTH-ANTIMONY ALLOYS.
Final rept. Jun 63-Apr 66.
by Henry N. Chuang. May 66, 171p
Contract AF 33 (657)-9914
Proj. AF-8169
Task 816904
AFAPL-TR-64-133-Pt-6
See also AD-628 630.

Descriptors: (*Thermoelectricity, Bismuth alloys), (*Bismuth alloys, Antimony alloys), (*Fluid flow, Pumps), Cryogenics, Magnetic properties, Electrical properties, Crystal, Band theory of solids, Semiconductors, Energy conversion.

The effect of a transverse magnetic field on the thermoelectric properties (Seebeck coefficient, thermal conductivity, electrical resistivity and figure of merit) of n-type polycrystals of bismuth-antimony alloys containing 0, 5, 12 and 19 atomic per cent antimony in bismuth have been investigated at 90K and 310K. Pure bismuth has the largest zero field Seebeck coefficient as well as figure of merit of all the samples tested at both 90K (-57 microvolts/ K and 0.00043/K) and 310K (-66 microvolts/K and 0.00034/K). The magnetoresistivity of the pure bismuth sample at 90K is extremely large, (7.5 times its zero field value at 4.1 kilogauss); it is believed due mainly to its special band structure (overlapped energy bands) which is one of the characteristics of semimetals. As a result of its extremely large magnetoresistivity, the figure of merit decreases with field at fields larger than a few hundred gauss. The zero field figure of merit of Bi95Sb5 at 310K is just slightly smaller than pure bismuth's (0.0003/K vs 0.00034/K) but its relative change is much larger so that its figure of merit overtakes pure bismuth's at a field of 4 kilogauss. The figure of merit of Bi88Sb12 under the presence of a magnetic field is very promising. It reached a value of about 0.0004/K at 4.1 kilogauss. The performance of Bi81Sb19 both at 310K and 90K, with and without a magnetic field, was very disappointing. (Author)

N66-12246 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
Pittsburgh Univ., Pa. Space Research Coordination Center.
OPTICAL STUDIES OF ELECTRON AND HOLE TRAPPING LEVELS IN QUARTZ.
by M. Schlesinger. 8 Oct 65, 23p SRCC-13
Grant NsG-416
NASA-CR-68091

Descriptors: *Spectral energy distribution, *Glow discharge, *Quartz, *Thermoluminescence.

For abstract, see T 66 17.

N66-13174 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
Old Dominion Coll., Norfolk, Va. Dept. of Physics.
DEFECT ANNEALING IN IRRADIATED SEMICONDUCTORS.
Progress rept. 1 Apr-30 Sep 65.
by W. M. Pritchard. 1 Oct 65, 13p
Grant NsG-602
NASA-CR-68458

Descriptors: *Semiconductor, *Annealing, *Irradiation.

N66-15600 **Field 20L**
CFSTI Prices: HC$3.00 MF$0.75
Stanford Research Inst., Menlo Park, Calif.
RESEARCH ON COLD CATHODES.
Quarterly rept. no. 1, 14 May - 14 Aug 65.
by D. V. Geppert. Aug 65, 99p
Contract NAS5-9581
NASA-CR-69441

Descriptors: *Barium oxide, *Cold cathode, *Gallium phosphide, *Hot electron.

N66-15622 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
Deptartment of Atomic Energy, Bombay (India).
ISOTOPIC EXCHANGE IN THE SOLID STATE AND THERMAL ANNEALING OF RECOIL DAMAGE IN COBALT.
by S. Khorana, P. K. Mathur, A. Nath, and S. Sarup. Jun 65, 11p AEET-216

Descriptors: *Annealing, *Ion exchange, *Recoil atom, *Solid state, *Cobalt compound, *Isotope.

N66-15790 **Field 20L**
CFSTI Prices: HC$2.00 MF$0.50
Natiional Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
THE ERECTED DIPOLE MODEL IN THE ADSORPTION OF CESIUM ON FLUORINATED MOLYBDENUM.
by L. K. Tower. Feb 66, 30p NASA-TN-D-3223

Descriptors: *Adsorption, *Cesium vapor, *Dipole, *Molybdenum.

N66-15982 **Field 20L**
CFSTI Prices: HC$3.00 MF$0.75
Philco Corp., Lansdale, Pa.
DESIGN, DEVELOPMENT, FABRICATION, AND DELIVERY OF IMPROVED MOS TRANSISTORS.
Quarterly progress rept. No. 2, 22 Aug - 21 Nov 65.
by E. S. Schlegel. 1965, 88p R-505
Contract NAS8-11926
NASA-CR-69652

Descriptors: *Silicon transistor, *Gamma radiation, *Metal oxide.

N66-16083 **Field 20L**
CFSTI Prices: HC$5.00 MF$1.00
Lockheed Missiles and Space Co., Sunnyvale, Calif.
SOLAR-RADIATION-INDUCED DAMAGE TO OPTICAL PROPERTIES OF ZN O-TYPE PIGMENTS.
Technical summary rept. 24 Jun 64-27 Jun 65. Sep 65, 171p LMSC-M-50-65-2
Contract NAS8-11266
NASA-CR-69713

Descriptors: *Optical property, *Protective coating, *Solar radiation, *Zinc oxide, *N-type semiconductor.

N66-18107 **Field 20L**
CFSTI Prices: HC$2.00 MF$0.50
Laboratoire de Physique Theorique et Des Hautes Energies, Orsay (France).
REMARKS ON SOME MODELS FOR FREEZING.
by B. Jancovici. Jan 66, 26p TH/121

Descriptors: *Freezing, *Approximation method, *Mathematical model.

PB-170 539 **Field 20L**
CFSTI Prices: HC$1.50 MF$0.50
Princeton Univ., N. J.
THE CREATION OF NEGATIVE ION VACANCIES IN ALKALI HALIDES WITH LOW ENERGY X-RAY (Creation par Rayons x de Faible Energie de Lacunes Negatives Dans Les Halogenures Alcalins).
by Barrie S. H. Royce. 1965, 28p
CEA-S-3

Presented at Seminaire de Chimie des Solides, Institut National des Sciences et Techniques Nucleaires, Saclay (France), 1965.

Descriptors: (*Crystal lattice defects, X rays), (*X rays, Crystal lattice defects), (*Color centers, X rays), Alkali metal compounds, Potassium compounds, Halides, Bromides, Chlorides, Photons, Ionization.

In a region of X-ray energies that is sufficiently low, the secondary electrons produced by the initial ionizing interaction between the X-ray photons and the host lattice, will have insufficient energy to cause the displacement of lattice ions. It is known, however, that vacancies in the mechanism of vacancy creation must be through the fundamental ionization process. It is the purpose of the paper to discuss some experiments designed to test a specific mechanism of negative ion vacancy formation and also some experiments which attempt to further the understanding of the anticentre of the vacancy. (Author)

PB-170 647 **Field 20L**
CFSTI Prices: HC$1.50 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
CONTRIBUTION A L'ETUDE PAR RESONANCE MAGNETIQUE DES PROPRIETES A BASSE TEMPERATURE DU SILICIUM FORTEMENT DOPE (Contribution to the Study, by Magnetic Resonance, of the Properties of Heavily Doped Silicon at Low Temperature.
Doctoral thesis in French.
by Denis Jerome. 16 Oct 65, 86p CEA-R-2893
Text in French; Attached Summary in English.

Descriptors: (*Semiconductors, Silicon), (*Silicon, Nuclear magnetic resonance), Impurities, Carriers (Semiconductors), Nuclear spins, Crystal lattice defects, Ions, Hyperfine structure, Band theory of solids, Relaxation time, Paramagnetic resonance.

The magnetic properties of heavily doped silicon at low temperature were studied in a range of concentration on either side of the Mott transition. For impurity densities less than that of the transition a magnetic double resonance method allows the exchange coupling between localized donors to be measured, and in addition the existence of paramagnetic centers (pairs of neutral and ionized donors) is demonstrated. The behaviour of the spin-lattice relaxation of Si29 is explained in terms of the dipolar coupling between nuclei and paramagnetic centers. In the range of concentration 10 to the 16th to 10 to the 17th power impurities/cu cm, the concentration dependent relaxation of donors was studied experimentally. A theoretical explanation is proposed for the latter mechanism, the basis of which is the presence of ionized pairs of donors. At increasing impurity concentrations the electronic delocalization increases. For the concentration of 2.5 X 10 to the 18th power P/cu cm the hyperfine coupling is responsible for the Si29 relaxation. It is shown that the electron density has a very large maximum near the impurities in the metallic domain of concentrations. An estimation of the impurity band width (10K) is deduced from the measurement of the paramagnetic part of the electronic susceptibility at low temperature. (Author)

AD-635 605 **See Field 20C**

AD-635 652 **See Field 7D**

AD-635 697 **See Field 11F**

AD-635 920 **See Field 20B**

AD-636 090 **See Field 20E**

AD-636 162 **See Field 14B**

AD-636 184 **See Field 20I**

AD-636 249 **See Field 10B**

AD-636 267 **See Field 9A**

BNL-952 **See Field 20B**

PB-170 648 **See Field 20B**

20M. THERMODYNAMICS

AD-635 683 **Field 20M, 21B, 13A, 20D K**
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
CONVECTIVE HEAT AND MASS TRANSFER IN THE COMBUSTION OF CHEMICALLY ACTIVE SUBSTANCES IN THE BOUNDARY LAYER ON A POROUS SURFACE.
by A. L. Batievskii, A. L. Mosse, and L. I. Tarasevich. 17 Mar 66, 15p ATD-66-26
TT-66-61683
Konvektivnyi Teplo- i Massoobmen pri Gorenii Khimicheski Aktivnykh Veshchest na Poristoi Poverkhnosti v Pogranichnom Sloe, trans. of mono. Teplo- i Massoobmen Tel s Okruzhayushchei Gazovoi Sredoi, Minsk, 1965 p168-175.

Descriptors: (*Cooling, *Porous materials), (*Heat transfer, *Combustion), (*Mass transfer, Combustion), Convection (Heat transfer), Gas flow, Injection, Chemical reactions, Laminar boundary layer, Turbulent boundary layer, Thermal insulation, USSR.

The solution of a number of problems involved in the creation of new equipment requires exploring methods of thermal protection of various construction materials used under extreme heat loads. Special attention is being given to one of the methods of thermal protection of surfaces against high-temperature flows. This method consists in the feeding of the coolant through a porous surface, and then the main flow, which flows over the surface, reacts with the coolant. The effect of combustion on the heat and mass transfer process during the injection of gas or liquid was studied both in the laminar and turbulent boundary layers. After elaborating a little more thoroughly on the above data, the 15 articles given in the Bibliography are analyzed and discussed. These articles, for the most part, are concerned with theoretic investigation of friction and heat transfer in a compressible turbulent boundary layer, with chemical reactions caused by the introduction of a foreign substance.

AD-635 816 **Field 20M, 20K**
CFSTI Prices: HC$1.00 MF$0.50
Brown Univ., Providence, R. I. Div of Applied Mathematics.
ON THE THERMODYNAMICS OF ELASTIC MATERIALS.
Technical rept.
by Morton E. Gurtin. May 66, 19p TR-12
Contract Nonr-562 (40)
Proj. NR-064-406

Descriptors: (*Elasticity, *Thermodynamics), (*Continuum mechanics, Elasticity), Thermal stresses, Energy, Entropy, Deformation, Temperature.

In a previous paper (Arch. Rational Mech. Anal. v19, p339, 1965) it was shown that in the absence of couple stresses and multipolar effects the Clausius-Duhem inequality requires that every elastic material be simple; i.e. that the stress, energy and entropy depend at most on the deformation gradient and temperature at the same point. It is the purpose of this paper to show that the theorem can be established in a more direct manner provided local behavior is assumed from the outset. (Author)

AD-635 976 **Field 20M**
CFSTI Prices: HC$3.00 MF$0.75
Air Force Inst. of Technology, Wright-Patterson AFB, Ohio. School of Engineering.
EFFECT OF VIBRATION ON THE HEAT TRANSFER RATE FROM CYLINDERS IN FREE CONVECTION IN AIR.
Master's thesis.
by Leon H. Chaffee. Jun 66, 85p GAM/ME/66B-10

Descriptors: (*Cylindrical bodies, *Heat transfer), (*Convection (Heat transfer), *Vibration), Boundary layer, Schlieren photography, Boundary layer transition, Thermodynamics.

The study was a follow-on investigation of the effects of sinusoidal vibration on the heat transfer rate from cylinders in free convection in air. The purpose was to obtain and correlate heat transfer data in the region of the critical Reynolds number, to investigate the effect of the vibration at higher Reynolds numbers through the use of a larger diameter cylinder, and to obtain Schlieren photographs of the boundary layer in the vicinity of the critical Reynolds number. Results show that each cylinder displays a similar characteristic pattern progressing from a region in which the heat transfer rate is independent of vibration, through a transition region, to a region where the heat transfer rate generally parallels the recommended forced convection curve of McAdams and is a function only of the vibration intensity. An increased frequency shifts the transition region in the direction of higher vibration intensities. Schlieren photographs show a considerable increase in turbulence in the boundary layer through the transition region. (Author)

AD-636 105 **Field 20M, 7D**
CFSTI Prices: HC$3.60 MF$0.50
RAND Corp., Santa Monica, Calif.
THERMODYNAMICS OF THE THOMAS-FERMI ATOM AT LOW TEMPERATURES.
by J. J. Gilvarry. 15 Jan 54, 36p P-474-AEC

Descriptors: (*Atomic properties, *Thermodynamics), Mathematical models, Low-temperature research, Special functions (Mathematical), Perturbation theory, Differential equations, Statistical mechanics.

It is shown that an expression for the Helmholtz function on the Thomas-Fermi atom model permits one, in the limit of low temperature T, to expand the total energy as an asymptotic series in T sq. Thermodynamic functions for the case of a first-order temperature perturbation are derived from the corresponding term in the asymptotic expansion of the energy. They depend (in addition to dependence on parameters of the unperturbed atom) on two parameters derived from solution of the differential perturbation equation. These parameters differ according as the differential perturbation equation is solved under a condition of fixed atomic volume or of zero initial slope (which is computationally more convenient and corresponds to published solutions). The asymptotic forms of the parameters in first case are determined for the two limits of an infinitesimal and an infinite atom. The boundary and initial parameters corresponding to fixed atomic volume are expressed in terms of the parameters corresponding to a solution under zero initial slope, and are evaluated in three cases from published solutions. These values are fitted by functions of the atom radius which have the proper limiting behavior for an infinitesimal and an infinite atom. Thus, a approximate values of the first-order temperature perturbation of thermodynamic functions become directly available. (Author)

AD-636 276 **Field 20M, 11B**
CFSTI Prices: HC$2.00 MF$0.50
Army Natick Labs., Mass. Pioneering Research Div.
THERMAL CONDUCTIVITY OF VITREOUS SILICA: SELECTED VALUES.
Technical rept.
by Lois C. K. Carwile, and Harold J. Hoge. Jul 66, 41p Thermal Conductivity-4
Proj. DA-1P014501B11A
USA-NLABS-TR-67-7-PR

Descriptors: (*Silicon compounds, *Thermal conductivity), Dioxides, Heat transfer, Glass, Quartz, Transport properties, Temperature, Calibration, Corrections.

Identifiers: Silicon dioxide.

The published literature on the thermal conductivity of vitreous silica has been assembled and the results critically evaluated. Best values of thermal conductivity as a function of temperature have been selected. These are presented in both graphical and tabular form. They cover the range 80 to 660K and published data extending from 3 to 2100K are shown in the graphs. An attempt was made to consult all work that could significantly affect the choice of best values. Published papers were located with the aid of Chemical Abstracts, Physics Abstracts, the Thermophysical Properties Retrieval Guide, and some other general sources. In addition, relevant references in the papers themselves were followed up until a substantially 'closed system' had been generated, as shown by the fact that no new references were being turned up. (Author)

ANL-7056 **Field 20M**
CFSTI Prices: HC$4.00 MF$0.75
Argonne National Lab., Ill.
AN INVESTIGATION OF LIQUID-METAL HEAT TRANSFER IN A COCURRENT-FLOW, DOUBLE-PIPE, HEAT EXCHANGER.
by Richard L. Merriam. Jun 65, 120p
Contract W-31-109-eng-38

Descriptors: (*Liquid metals, Heat transfer), (*Heat transfer, Heat exchangers).

For abstract, see N 20 15.

ANL-7100 **Field 20M, 18D**
CFSTI Prices: HC$6.75 MF$2.75
Argonne National Lab., Ill.
PROCEEDINGS OF THE CONFERENCE ON APPLICATION OF HIGH-TEMPERATURE INSTRUMENTATION TO LIQUID-METAL EXPERIMENTS, SEPTEMBER 28-29, 1965.
1965, 665p
Contract W-31-109-eng-38
CONF-650 946

Descriptors: (*High temperature research, Liquid metals), (*Liquid metals, High temperature research).

For abstract, see N 20 15.

N66-12192 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
Brown Engineering Co., Inc., Huntsville, Ala. Research Labs.
A METHOD FOR DIGITAL CALCULATION OF EQUILIBRIUM THERMODYNAMIC PROPERTIES OF AIR.
by V. L. Reed. Jul 63, 43p R-58
Contract NAS8-2485
NASA-CR-68123

Descriptors: *Boltzmann distribution, *Air mass, *Thermodynamic equilibrium.

N66-13008 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
No. Dakato Univ. Grand Forks. Engineering Experiment Station.
TIME-TEMPERATURE CHARACTERISTICS OF THIN-SKINNED MODELS AS AFFECTED BY THERMOCOUPLE VARIABLES.
Semiannual rept. no. 1.
by M. B. Larson. Oct 65, 9p
Grant NGR-35-002-003
NASA-CR-68315

Descriptors: *Laplace transform, *Thermocouple, *Skin temperature, *Time factor.

N66-13170 **Field 20M**
CFSTI Prices: HC$3.00 MF$0.50
California Univ., Berkeley. Inst. of Engineering Research.
INFRARED RADIATION OF CARBON MONOXIDE AT HIGH TEMPERATURES.
by M. M. Abu-Romia. 30 Sep 65, 57p TS-65-5
Contract NAS8-11468
NASA-CR-68504

Descriptors: *Infrared radiation, *Absorption spectrum, *Carbon monoxide.

N66-15434 **Field 20M**
CFSTI Prices: HC$3.00 MF$0.50
Yale Univ., New Haven, Conn.
SOME CALCULATIONS PERTAINING TO THE FEASIBILITY OF MEASURING LUNAR HEAT FLOW.
Final rept.
by S. P. Clark Jr. Sep 65, 58p
Grant NsG-400
NASA-CR-69267

Descriptors: *Periodic function, *Heat flow, *Lunar surface, *Steady state.

N66-15576 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
General Electric Co., Philadelphia, Pa. Missile and Space Div.
SHOCK TUBE TECHNIQUES FOR STUDIES OF HIGH TEMPERATURE GAS RADIANCE.
by J. S. Gruszczynski, D. A. Rogers, and W. R. Warren. Oct 65, 42p R65SD33
Contracts NAS7-100, NASw-939
NASA-CR-69429
Prepared in cooperation with Jet Propulsion Lab., Contract JPL-950297.

Descriptors: *Electromagnetic shock tube, *Equilibrium, *High temperature gas, *Radiation measurement, *Radiation, *Nonequilibrium radiation.

N66-15577 **Field 20M**
CFSTI Prices: HC$5.00 MF$1.25
General Electric Co., Philadelphia, Pa. Missile and Space Div.
COATING SELECTION PROGRAM. PART II-PROGRAM DESCRIPTION AND USER'S MANUAL.
Final rept.
25 Oct 65, 196p Rept. no. 65SD526
Contract NASw-960
NASA-CR-69430

Descriptors: *Computer program, *Spacecraft control, *Temperature control.

N66-15589 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
Delaware Univ., Newark.
EQUILIBRIUM TEMPERATURES OF MASS TRANSFER COOLED WALLS IN HIGH-SPEED FLOW OF AN ABSORBING-EMITTING GAS.
by J. P. Hartnett, J. D. Novotny, and Y. Taitel.
1965, 30p
Grant NsG-356
NASA-CR-69437

Descriptors: *Mass transfer, *Cooling, *Couette flow, *Gas flow, *Wall temperature distribution.

N66-15593 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
Delaware Univ., Newark.
MASS TRANSFER COOLING IN LAMINAR BOUNDARY LAYERS WITH HYDROGEN INJECTED INTO NITROGEN AND CARBON DIOXIDE STREAMS.
by J. P. Hartnett, C. S. Liu, and H. A. Simon.
1965, 32p
Grant NsG-356
NASA-CR-69443

Descriptors: *Mass transfer, *Surface cooling, *Laminar boundary layer.

N66-15599 **Field 20M**
CFSTI Prices: HC$3.00 MF$0.50
General Electric Co., Philadelphia, Pa. Missile and Space Div.
COATING SELECTION PROGRAM. PART III. PROGRAM LISTING.
25 Oct 65, 55p Rept. no. 65 SD 526-Rev-A
Contract NASw-960
NASA-CR-69431

Descriptors: *Computer program, *Spacecraft control, *Temperature control.

N66-16162 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
USE OF FUSIBLE TEMPERATURE INDICATORS FOR OBTAINING QUANTITATIVE AERODYNAMIC HEAT-TRANSFER DATA.
by J. L. Hunt, and R. A. Jones. Feb 66, 30p
NASA-TR-R-230

Descriptors: *Thin film, *Aerodynamic heat transfer, *Heat-transfer coefficient, *Hypersonic speed.

N66-17898 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
EXPERIMENTAL AND ANALYTICAL INVESTIGATION OF INTERFACIAL HEAT AND MASS TRANSFER IN A PRESSURIZED TANK CONTAINING LIQUID HYDROGEN.
by W. A. Olsen. Mar 66, 45p NASA-TN-D-3219

Descriptors: *Two-phase system, *Heat transfer, *Interface, *Liquid hydrogen, *Mass transfer.

N66-18026 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
Illinois Univ., Urbana.
THEORETICAL STUDY OF RADIANT HEAT EXCHANGE FOR NON-GRAY NON-DIFFUSE SURFACES IN A SPACE ENVIRONMENT.
Semiannual status rept. no. 2, Aug 65-Feb 66.
by R. G. Hering, A. F. Houchens, and T. Smith.
1 Feb 66, 42p
Grant NGR-14-005-036
NASA-CR-70748

Descriptors: *Heat exchanger, *Metal surface, *Radiant energy, *Reflection coefficient, *Surface roughness, *Energy distribution.

N66-18169 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
THERMAL CONDUCTIVITIES OF ORDINARY AND ISOTOPICALLY SUBSTITUTED POLAR GASES AND THEIR EQUIMOLAR MIXTURES.
by C. E. Baker, and R. S. Brokaw. Mar 66, 27p
NASA-TN-D-3325

Descriptors: *Gas mixture, *Thermal conductor, *Hot-wire measurement, *Polar gas.

N66-18170 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
LOCAL HEAT-TRANSFER COEFFICIENTS FOR CONDENSATION OF STEAM IN VERTICAL DOWNFLOW WITHIN A 5/8-INCH-DIAMETER TUBE.
by R. G. Dorsch, and J. H. Goodykoontz. Mar 66, 46p NASA-TN-D-3326

Descriptors: *Liquid-vapor interface, *Condenser, *Heat transfer, *Vertical motion.

N66-18171 **Field 20M**
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
THERMODYNAMIC AND TRANSPORT PROPERTIES FOR THE N2/4 REVERSABLE REACTION 2 NO2 REVERSABLE REACTION 2 NO PLUS O2 SYSTEM.
by R. S. Brokaw, and R. A. Svehla. Mar 66, 58p
NASA-TN-D-3327

Descriptors: *Chemical equilibrium, *Nitrogen, *Oxygen, *Thermodynamic property, *Transport property.

N66-18379 **Field 20M**
CFSTI Prices: HC$3.00 MF$0.50
United Nuclear Corp., White Plains, N. Y. Development Div.
THERMAL CONDUCTIVITY OF HYDROGEN FROM 2000 TO 4700 DEG F.
by T. D. Hawkins, S. C. Hyman, S. L. Israel, and R. T. Salter. 15 Mar 65, 51p
Contract NAS3-3205
NASA-CR-54351
Presented at the Heat Transfer Conf. (ASME-AICHE), Los Angeles, Aug 8-11, 1965.

Descriptors: *Conductivity, *Hydrogen, *Thermal conductor, *Heat transfer.

N66-18478 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
General Dynamics/Astronautics, San Diego, Calif.
CENTAUR 1/10TH SCALE MODEL BASE HEATING STUDY.
by R. F. Yurczyk. 21 Aug 64, 41p GD/A-BTD-64-137
Contract NAS3-3232
NASA-CR-54525

Descriptors: *Centaur launch vehicle, *Base heating, *Flow field, *Heat effect, *Reversed flow.

AD-635 621 **See Field 11B**

AD-635 669 **See Field 11I**

AD-635 853 **See Field 20K**

AD-635 971 **See Field 20D**

AD-636 152 **See Field 11F**

AD-636 157 **See Field 7D**

AD-636 265 **See Field 15F**

N66-15120 **See Field 1A**

PB-170 764 **See Field 7D**

20N. WAVE PROPAGATION

AD-267 163 **Field 20N, 9E, 9F**
CFSTI Price: HC$4.00
Stanford Research Inst., Menlo Park, Calif.
STUDY OF THE EFFECTS OF ENVIRONMENTAL CONDITIONS ON THE BREAKDOWN OF ANTENNAS AT LOW PRESSURES ON A SUPERSONIC VEHICLE.
Final rept.
by J. B. Chown, and M. G. Keenan. Sep 61, 73p
Contract AF 19 (604)-5483
Proj. SRI-2879
AFCRL-940

Descriptors: (*Antennas, Leakage (Electrical)), (*Guided missile antennas, Failure (Electronics)), (*Telemetering antennas, Failure (Electronics)), Supersonic characteristics, Vacuum, Space environmental conditions, Radiofrequency power, Flight tests, Nose cones, Surface temperatures, X band, Very low frequency, Guided missiles (Surface-to-air).

Identifiers: Breakdown (Electrical).

The breakdown characteristics of antennas under supersonic flight conditions at altitudes up to 80 miles were investigated. Three Nike-Cajun rockets were instrumented and fired from Eglin Gulf Test Range on 4 November 1960 and on 14 and 24 March 1961. Significant results were obtained only from the 14 March firing. Details of the instrumentation are given, as well as a discussion of the data obtained. Data are given on the RF power required to initiate and extinguish breakdown, surface temperatures, and pressure on the surface of the conical nose. A comparison of breakdown data with previously obtained laboratory data and with the theory of breakdown phenomena reveals discrepancies which remain unresolved due to the limited quantity of flight data available for analysis. (Author)

AD-435 973 **Field 20N, 4A**
CFSTI Price: HC$1.50
Mitre Corp., Bedford, Mass.
PROCEEDINGS OF THE TROPOSPHERIC REFRACTION EFFECTS TECHNICAL REVIEW MEETING (2d), VOLUME I.
Mar 64, 202p
Contract AF 19 (628)-2390
Proj. AF-705.1
ESD-TDR-64-103-Vol-1
See also AD-441 576, -442 626, -609 731.

Descriptors: (*Troposphere, Refractive index), (*Atmospheric refraction, Symposia), Ionospheric propagation, Refractometers, Atmospheric electricity, Cloud cover, Electromagnetic waves, Propagation, Guided missile ranges, Refraction.

The publication covers the papers presented at the Second Tropospheric Refraction Effects Technical Review Meeting, sponsored by the Electronic Systems Division of the Air Force. The meeting was held at The MITRE Corporation on November 13 and 14, 1963. The papers are grouped into five sections, each section corresponding to the agency or type of organization sponsoring the work. The first section covers work on tropospheric refraction sponsored by the Electronic Systems Division in support of metric instrumentation on the national missile ranges. This work is under the technical direction of The MITRE Corporation. (Author)

AD-441 576 **Field 20N, 4A, 22C**
CFSTI Price: HC$1.50
Mitre Corp., Bedford, Mass.
PROCEEDINGS OF THE TROPOSPHERIC REFRACTION EFFECTS TECHNICAL REVIEW MEETING (2d), VOLUME II.
Apr 64, 143p
Contract AF 19 (628)-2390
Proj. AF-705.1
ESD-TDR-64-103-Vol-2
See also AD-435 973, -442 626.

Descriptors: (*Troposphere, Refractive index), (*Atmospheric refraction, Symposia), (*Spacecraft, Tracking), Real time, Ranges (Distance), Radar tracking, Guided missile ranges, Multipath transmission, Refraction.

Contents: The troposphere and its influence on spacecraft tracking; Real-time compensation for Tropospheric effects on the measurement of range and range rate; Accuracy of tropospheric refraction correction procedures; Tracking data accuracy; Correction of radar elevation angles less than one degree; Tracking errors at low-elevation angles due to tropospheric refractive effects; Measurements of radar pointing errors at low-elevation angles and comments on N-bar approach to refraction error corrections; Multipath propagation; Canadian reflection-interferometer elevation angle error measurements.

AD-442 626 **Field 20N, 4A**
CFSTI Price: HC$4.00
Mitre Corp., Bedford, Mass.
PROCEEDINGS OF THE TROPOSPHERIC REFRACTION EFFECTS TECHNICAL REVIEW MEETING (2d). VOLUME III.
May 64, 95p
Contract AF 19 (628)-2390
Proj. AF-705.1
ESD-TDR-64-103-Vol-3
See also AD-435 973, AD-441 576.

Descriptors: (*Troposphere, Refractive index), (*Atmospheric refraction, Symposia), Refraction, Phase measurement, Instrumentation, Ranges (Establishments), Refractometers, Tables, Aerial targets, Microwaves, S band, Measurement.

Contents: RADC exploratory research program in propagation as it relates to range instrumentation; tropospheric phase path fluctuations at S-band; Target accuracy-radio seeing through the troposphere; Optical-microwave refraction comparisons; Dual-cavity refractometer; New values of the optical air mass and the refraction and comparison with previous tables; Refractometer Activity; Bibliography (400 items).

AD-635 774 **Field 20N, 12A**
CFSTI Prices: HC$4.00 MF$0.75
Illinois Univ., Urbana. Antenna Lab.
A TECHNIQUE FOR SOLVING CERTAIN WIENER-HOPF TYPE BOUNDARY VALUE PROBLEMS.
Technical rept.
by C. P. Bates, and R. Mittra. May 66, 113p TR-9, 66-4
Contract AF 19 (628)-3819, Grant NsG-395
Proj. AF-5635
Task 563502
AFCRL-66-352

Descriptors: (*Boundary value problems, *Electromagnetic waves), Harmonic analysis, Waveguides, Dielectrics, Plasma medium, Complex variables, Functions.

The time-harmonic analysis of three boundary value problems containing semi-infinite boundaries is presented. The first problem considered is a parallel plate waveguide with one plate truncated and radiating into free space. The excitation of a dielectric slab and the excitation of an isotropic, incompressible, plasma slab by means of a parallel plate waveguide with one plate truncated are the second and third problems analyzed, respectively. A function of a complex variable is factored in each of these Wiener-Hopf type boundary value problems. The function is analytic in a strip and is factored into a product of two functions. One of these functions is analytic in a half-plane while the other is analytic in the adjacent half-plane with an overlap in the regions of analyticity coinciding with the strip. This factorization is obtained by a technique developed in this work. The technique obtains the factorization for the open-region problem from a function and its factorization that occurs in a related closed-region problem. A closed-region problem is one whose transverse dimensions are finite. The chosen closed-region boundary value problem yields a function of a complex variable which can be factored. The factorization of the function for the open-region boundary value problem is obtained by taking the limit, as a parameter approaches infinity, of the function and factorization appropriate to the closed-region structure. By this means the factorization and hence the solution to the open-region boundary value problem is obtained. (Author)

AD-635 860 **Field 20N, 4A**
CFSTI Prices: HC$15.50 MF$1.00
Stanford Univ., Calif. Stanford Electronics Labs.
FIXED FREQUENCY BACKSCATTER, IGY PROJECT 6.12 (IONOSPHERIC PHYSICS).
Data summary rept.
by R. D. Egan, D. S. Pratt, and N. Hood. 10 Sep 58, 159p Rept. no. 2
Grant NSF-Y-6.12/62

Descriptors: (*Ionospheric propagation, *Electromagnetic wave reflections), High frequency, Scattering, Radio waves, Diurnal variations, Graphics, Measurement, Ionosphere, Data.

Identifiers: Backscatter echoes, International Geophysical year.

This report is the second in a series of data summeries to be compiled from the records of the U. S. IGY backscatter sounders. Three different sets of data are presented in this report: Section A contains data on F-layer echo-range; Section B contains summaries of sporadic-E occurrence; and Section C contains summaries of data on field-aligned irregularities in the ionosphere.

AD-635 874 **Field 20N, 20I**
CFSTI Prices: HC$2.00 MF$0.50
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
NONLINEAR ELECTROMAGNETIC WAVE PROPAGATION IN PLASMAS.
Physical sciences research papers.
by Robert J. Papa. May 66, 37p AFCRL-PSRP-230, AFCRL-66-347
Proj. AF-4642
Task 464202

Descriptors: (*Electromagnetic waves, Propagation), (*Plasma medium, Wave transmission), Nonlinear systems, Dielectrics, Plasma sheath, Antennas, Reentry vehicles, Dielectric properties, Electron density.

Identifiers: Wave propagation.

A review is presented of the current literature pertaining to high power rf field-plasma interactions. In the survey, the class of nonlinear interactions is restricted to the case where the effective dielectric constant of the plasma is a function of the local electric field intensity. Since the propagation characteristics of an em wave depend upon the effective dielectric constant, the presence of an intense rf field can modify the propagation characteristics of an em wave. The assumptions and basic theoretical approach of each author are discussed and the most significant results are summarized. The approaches used by different authors are compared. A critique is made of the various approaches and their advantages and limitations are pointed out. (Author)

AD-635 878 **Field 20N, 20K**
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
THE PHENOMENON OF GENERATION BY A CIRCULAR CYLINDER AND A SPHERE.
by A. M. Goncharenko, and B. A. Sotskii. 20 Jun 66, 12p TG-230-T477
Contract NOw-62-0604-c
TT-66-61805
Trans. of Akademiya Navuk BSSR, Minsk. Doklady, v8 n12 p784-7 1964.

Descriptors: (*Electromagnetic waves, Propagation), (*Spheres, Electromagnetic waves), (*Cylindrical bodies, Electromagnetic waves), Lasers, Effectiveness, Theory, Dielectrics, USSR.

The problem of stimulated electromagnetic wave emission from a circular cylinder and a sphere is investigated theoretically on the basis of Maxwell's equations. In particular, it is shown that radiation similar to that of a sphere should occur on the lateral surface of a cylinder. This radiation, since it is not used, is a source of additional energy losses and reduces the efficiency of a laser. These losses should not appear in a gaseous laser nor when the lateral wall of a cylinder with a refractive index greater than in the active medium is enclosed in a dielectric. Transverse-electric modes are considered; all the computations are the same for transverse-magnetic modes. (Author)

AD-635 891 **Field 20N**
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
ON THE PROPAGATION OF STRONG RADIOWAVES IN THE IONOSPHERE.
by E. I. Ginzburg. 27 Jun 66, 15p TG-230-T484
Contract NOw-62-0604-c
TT-66-61810
Trans. of Izvestiya Vysshikh Uchebnykh Zavedenii. Radiofizika (USSR) v7 n6 p1041-8 1964.

Descriptors: (*Ionospheric propagation, Radio waves), USSR, Partial differential equations, Plasma medium, Radio fields, Intensity.

Propagation in the lower ionosphere of very strong radiowaves whose field strengths considerably exceed any characteristic plasma field is considered. Formulas are deduced for the change in amplitude of the field intensity as a function of penetration into the weakly ionized plasma. (Author)

AD-635 939 **Field 20N**
CFSTI Prices: HC$2.00 MF$0.50
Sylvania Electronic Systems-East, Waltham, Mass. Applied Research Lab.
MAGNETIC DIRECTION DEPENDENCE OF THE VLF PHASE VELOCITY FOR THE FIRST TWO WAVEGUIDE MODES.
Research rept.
by J. Galejs. Jun 66, 32p RR-504
Contract Nonr-3185 (00)
Proj. 110

Descriptors: (*Ionospheric propagation, Very low frequency), Ionosphere, Atmosphere models, Magnetic fields, Cylindrical bodies, Interference, Electrical impedance.

The methods previously reported for the computation of the complex propagation constant for the dominant VLF waveguide mode (n=1) are extended to the second mode (n=2). A stratified cylindrical ionosphere model with axial magnetic field is used to determine the wave impedances needed in the subsequent iterative procedure which yields the modal p ropagation constants in the magnetic East to West (EW) and magnetic West to East (WE) directions. The predictions for phase velocity differences between modes n=1 and n=2 can account for the recently reported observations on the magnetic direction dependence of the distance D between interference minima of these modes propagating below the nighttime ionosphere. The individual height variations of the components of the conductivity tensor should be considered, and ionosphere models of exponential height variation of conductivity are not adequate. The phase velocity difference between the two modes is less than one per cent, but it is smallest for EW propagation, so that the mode interference distance is 1000 to 2000 km greater for EW propagation than for WE propagation. (Author)

AD-636 096 **Field 20N, 20I**
CFSTI Prices: HC$2.00 MF$0.50
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
WAVE PROPAGATION IN A NON-MAXWELLIAN, MAGNETOACTIVE, NONLINEAR PLASMA.
Physical sciences research papers.
by Robert J. Papa, and Richard E. Haskell. May 66, 50p AFCRL-PSRP-233, AFCRL-66-372
Proj. AF-4642
Task 464202

Descriptors: (*Wave transmission, Plasma medium), (*Electromagnetic waves, Plasma medium), (*Plasma physics, Wave transmission), Radio waves, Propagation, Numerical analysis.

Expressions for the components of a nonlinear ac conductivity tensor have been derived - corresponding to a temperate, weakly ionized, lossy magnetoplsma. The electrical conductivity tensor is nonlinear because its components are functions of the isotropic part of the electron velocity distribution function f, where f depends upon the amplitude and polarization of the local rf field, By diagonalizing the conductivity tensor and referring Maxwell's field equations to the principal co-ordinate directions, it is shown that an elliptically polarized em wave normally incident upon an inhomogeneous magnetoplasma slab will launch only a right-hand and left-hand wave into the plasma if both the dc magnetic field and the electron density gradients are perpendicular to the interfaces. The net reflection transmission coefficients for left-hand and right-hand modes are computed using a Runge-Kutta numerical integration procedure. For low power levels, the right-hand and left-hand waves propagate independently of one another. For high field intensities, the propagation of the right-hand mode depends upon the amplitude of the left-hand mode, and vice versa. Reflection and transmission coefficients are presented as a function of normalized plasma parameters. (Author)

AD-636 145 **Field 20N**
CFSTI Prices: HC$1.00 MF$0.50
Research Lab. of Electronics, Massachusetts Inst. of Tech., Cambridge.
ELEMENTARY THEORY OF TRANSMISSION AND REELECTION: FUNDAMENTAL RELATIONS AND GEOMETRY.
Technical rept.
by R. M. Redheffer. 20 Nov 46, 22p TR-24
Contract W-36-039-sc-32037

Descriptors: (*Wave transmission, *Microwave frequency), (*Electromagnetic wave reflections, Theory), Geometry.

The concept of linearity and the relations fundamental to transmission and reflection theory are derived from the properties at the terminals of an object, without reference to its interior. The so-called vector diagram of conventional theory is interpreted as a conformal mapping, as a polar plot, and as a linear transformation. Conditions for its exact validity are obtained, as are the errors when the diagram is known to be only approximate. When no approximations are made, different interpretations of the vector diagram lead to different geometrical figures, each of which is investigated in detail. For ease of reference the results are summarized in numbered paragraphs distributed throughout the text. (Author)

N66-14963 **Field 20N**
CFSTI Prices: HC$6.00 MF$1.25
Ohio State Univ. Research Foundation, Columbus. Antenna Lab.
A MORE EXACT THEORY OF BACKSCATTERING FROM STATISTICALLY ROUGH SURFACES.
by D. E. Barrick. 31 Aug 65, 205p Rept. no. 1388-18
Grant NsG-213
NASA-CR-69200

Descriptors: *Backscatter, *Electromagnetic scattering, *Physical optics, *Approximation method, *Surface roughness.

For abstract, see T 66 17.

N66-18136 **Field 20N**
CFSTI Prices: HC$2.00 MF$0.50
Cekmece Nuclear Research Center, Istanbul (Turkey).
PROPAGATION OF PLANE WAVES IN AN ELASTIC MEDIUM WITH COUPLE STRESS.
by E. S. Suhubi. Feb 65, 32p CNAEM-22

Descriptors: *Coupled stress, *Elastic medium, *Plane wave, *Wave propagation.

N66-18402 Field 20N
CFSTI Prices: HC$1.00 MF$0.50
Michigan Univ., Ann Arbor. Radiation Lab.
APPLICATION OF CONFORMAL MAPPING TO DIFFRACTION AND SCATTERING PROBLEMS.
by R. F. Goodrich, and S. Hong. 1964, 7p
Grant NsG-444
NASA-CR-60611
Presented at the Symp. on Electromagnetic Wave Theory, Delft, Netherlands, Sep 6-11, 1965.

Descriptors: *Conformal mapping, *Plane wave, *Integral equation, *Scattering cross section, *Wave diffraction.

21A. AIR-BREATHING ENGINES

AD-635 950 Field 21A
CFSTI Prices: HC$5.00 MF$1.00
General Electric Co., West Lynn, Mass.
INVESTIGATION OF PERFORMANCE OF MULTIPLE GAS GENERATORS WITH A COMMON EXHAUST.
Final rept.
by Roger M. Woodward. May 66, 160p GE-TM65SE-20
Contract DA-44-177-AMC-274 (T)
Task 1M121401A14415
USAAVLABS-TR-66-28

Descriptors: (*Gas generator engines, Exhaust systems), Performance (Engineering), Power, Failure (Mechanics), Multiple operation, Monte Carlo method, Programming (Computers), Propulsion, Rotor blades (Rotary wings), Ducted fans.

Identifiers: T-64 engines.

A system wherein multiple engines exhaust into a common exhaust is analyzed on both a steady-state performance and transient response basis. A failure analysis of the system is also included. Engine to engine variations have been considered together with the effects of externally induced mismatches. It is concluded that maximum power is obtained by rating the engines on a T5 basis and trimming the exhaust area upon installation. It is shown that the greater the number of engines combined in a common exhaust, the lower the average performance compared to separately ducted engines; however, the averaging effect of the number of engines and the trim method recommended keeps the minimum system performance above that which would be calculated from single-engine guarantee performance. A fundamental problem in the common engine system is that of acceleration delay or hangup resulting in deceleration during transient conditions. This problem can be eliminated in the two-engine system by using a high idle speed and can be prevented in the four-engine system by a combination of high idle speed and can be prevented in the four-engine system by a combination of high idle speed and a simple gas generator coordination control. If accessory power is to be extracted, this must be extracted equally from all engines. (Author)

21B. COMBUSTION AND IGNITION

AD-635 683 See Field 20M

AD-635 741 See Field 10B

AD-636 111 See Field 20D

AD-636 165 See Field 19G

21C. ELECTRIC PROPULSION

N66-12349 Field 21C
CFSTI Prices: HC$4.00 MF$0.75
Hughes Research Labs., Malibu, Calif.
ION ENGINE SUPPORTING RESEARCH AND EVALUATION. VOLUME II - IONIZATION STUDIES.
Summary rept.
by O. K. Husmann. Nov 65, 106p
Contract NAS3-4110
NASA-CR-54411

Descriptors: *Desorption, *Ion source, *Radioactive contamination, *Refractory metal.

For abstract, see T 66 17.

N66-13242 Field 21C
CFSTI Prices: HC$5.00 MF$1.25
Research and Advanced Development Div. AVCO Corp., Wilmington, Mass.
ARC JET TECHNOLOGY RESEARCH AND DEVELOPMENT.
Final rept. 3 Jun 64-11 Sep 65.
22 Dec 65, 187p RAD-TR-65-37
Contract NAS3-5900
NASA-CR-54687

Descriptors: *Magnetoplasma, *Thrustor, *Arc jet, *Propulsive efficiency.

N66-16161 Field 21C
CFSTI Prices: HC$3.00 MF$0.75
Cosmic, Inc., Washington, D. C.
FURTHER DEVELOPMENT OF A CHARGED LIQUID COLLOID SOURCE FOR ELECTROSTATIC PROPULSION.
Final rept.
by H. F. Anton, D. Gignoux, R. M. Moriarty, and J. J. Shea. Oct 65, 74p Rept. no. 106
Contract NAS3-6268
NASA-CR-54642

Descriptors: *Electrostatic propulsion, *Liquid drop, *Propulsion system, *Performance characteristics.

21D. FUELS

AD-454 998 Field 21D
CFSTI Price: HC$6.00
Southwest Research Inst., San Antonio, Tex.
EFFECT OF ADDITIVES ON THE STORAGE STABILITY OF HIGH-TEMPERATURE FUELS.
Final technical rept., 15 Jun 63-14 Nov 64.
by Robert K. Johnston, and E. L. Anderson Dec 64, 139p RS-433
Contract AF 33 (657)-11246
Projs. SwRI-09-1370, AF-3048
Task 304801
AFAPL-TR-64-142, N65-24439

Descriptors: (*Fuels, Storage), (*Jet engine fuels, Storage), (*Fuel additives, Storage), Thermal stability, Degradation, Test equipment, Oxygen.

A study was made of the use of additives to prevent or retard the deterioration of JP-6 fuel thermal stability during storage. Fuel-additive blends were stored at 130F in sealed 15-gallon steel drums for periods up to 16 weeks. Thermal stability was measured by means of a modified fuel coker developed during this program, using helium pressurization instead of a fuel pump. The standard ASTM-CRC fuel coker and the Eppi-CRC modified fuel coker were found to be unsuitable for this purpose, owing to contamination of the test sections with pump wear debris. A total of 52 additives were submitted by industry for evaluation, from which 19 were selected by screening tests for inclusion in the hot-room storage program. Three JP-6 fuels were used as the base stocks for additive evaluation. Under storage conditions giving a 100F decrease in base fuel thermal stability, four additives or combinations of additives were found to be effective in maintaining thermal stability. These results indicate that the use of additives is a feasible approach to solving current problems in this area. (Author)

AD-635 631 Field 21D
CFSTI Prices: HC$1.00 MF$0.50
IIT Research Inst., Chicago, Ill. Technology Center.
DETECTION OF WATER IN JET FUEL. ITEM I: BREADBOARD INSTRUMENT.
Bimonthly progress rept. no. 1, 21 Apr-21 Jun 66.
by Martin J. Salkowski. 14 Jul 66, 20p IITRI-C6091-1-1
Contract NObs-94353
Projs. C6091, SF013-06-20
Task 3950

Descriptors: (*Jet engine fuels, Water), (*Water, Detection), (*Infrared optical systems, Jet engine fuels), Absorption spectrum, Instrumentation, Design, Contamination, Test equipment, Colloids.

The objective of the program is to develop two instruments: one for detecting water in jet fuel and the other for detecting water in residual fuel. The basic technique being considered is infrared absorption at the 2.8-micron wavelength. At this point in the infrared spectrum, the extinction coefficient for the HOH structure is large. By utilizing the long wavelengths of light, the extinction coefficient for secondary contamination is small. This specificity will make the instrumentation accurate and reliable. Also, the measurements will be noncumulative, as compared with techniques that the Navy utilizes today. (Author)

AD-635 877 Field 21D
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
POWER CHARACTERISTICS OF FUELS FOR AVIATION GAS-TURBINE ENGINES.
by V. N. Zrelov. 26 May 66, 13p FTD-TT-65-1905
TT-66-61804
Unedited rough draft trans. of Neftepererabotka i Neftekhimiya (USSR), n2 p22-6 1964.

Descriptors: (*Aviation fuels, Power), (*Jet engine fuels, Power), Gas turbines, Heat, Density, Combustion, Petroleum, Polycyclic compounds, USSR.

The evaluation of the power characteristics of fuels for modern gas-turbine engines should be done starting from their weight heat-producing capacity, density, and completeness of combustion corresponding to the altitude of flight. For improving the power characteristics of fuels for aviation gas-turbine engines, a greater amount of high-boiling fractions should go into their composition. The greatest power possibilities, which exceed by 10 to 13% those of modern jet fuels, are possessed by fuels which contain bicyclic naphthenic hydrocarbons that are derivatives of dicyclohexyl. (Author)

AD-635 929 Field 21D, 6M
CFSTI Prices: HC$3.00 MF$0.75
Melpar, Inc., Falls Church, Va.
MECHANISM OF MICROBIOLOGICAL CONTAMINATION OF JET FUEL AND DEVELOPMENT OF TECHNIQUES FOR DETECTION OF MICROBIOLOGICAL CONTAMINATION.
Semiannual progress rept., 1 Jan-1 Jun 65.
by Gordon C. Blanchard, and Charles R. Goucher. Jul 66, 82p
Contract AF 33 (657)-9186
Task 304801
See also AD-612 792.

Descriptors: (*Biological contamination, *Jet engine fuels), (*Fuel contamination, Microorganisms), Determination, Culture media, Fungi, Corrosion, Oxidation, Fungus deterioration, Aluminum alloys.

Two methods for detecting microorganisms were examined in the light of the present understanding of the jet fuel microorganisms. One method was based on a color produced by the enzymes of the organism. This method was found suitable for the detection of organisms in the early part of their growth in fuel systems. However, the sensitivity

of the method declined slightly with the age of the culture. Another detection method was devised, tested, and found to be highly sensitive and independent of the age of the culture. This detection method has two simple steps. The first step is the reaction of microbial cells with a specific metal ion; the second step is the reaction of bound metal ions with a colored reagent. The method promises to yield a simple visual readout system capable of field application. The production of compounds by microorganisms associated with aluminum corrosion was dependent on the presence of high concentrations of nitrate ion as well as on jet fuel components. A direct relationship was found between the onset time of respiratory decline and the appearance of corrosive pigments in microbial cultures oxidizing jet fuel. (Author)

AD-635 606 **See Field 1B**

21E. JET AND GAS TURBINE ENGINES

AD-448 095 **Field 21E, 11F**
CFSTI Price: HC$3.00
Materials Advisory Board, NAS-NRC, Washington, D. C.
BERYLLIUM USAGE AND DIFFICULTIES IN GAS TURBINE ENGINES.
Progress rept. no. 2.
by J. H. Young, and D. K. Hanink. 1964, 85p
MAB-199-M (2)

Descriptors: (*Beryllium, Gas turbines), (*Gas turbine, Beryllium), Engine structures, Metallography.

For abstract, see T 66 17.

AD-635 893 **Field 21E**
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
SUCCESSFUL DEMONSTRATION AND VERIFICATION OF RAM-JET THRUST IN SUPERSONIC FLIGHT.
19 Jun 45, 6p Bumblebee-15

Descriptors: (*Ramjet engines, Thrust), (*Thrust, Jet propulsion), Supersonic flight, Jet planes, Flight testing, Model tests.

An unequivocal demonstration of ram -jet thrust at supersonic speeds took place Wednesday, June 13, 1945, with the launching at Island Beach, New Jersey, of a Model 3 ram-jet, whose range (about 11,000 yards) was nearly double that of the same model launched 'cold.' This was verified the following day by launching a second bird identical to the first, and the range this time was recorded as 14,000 yards. Both, the above birds burned CS2. Supporting evidence was accumulated by the launching of two additional models similar to the above except for the use of pentane and acetaldehyde fuels, respectively; these latter units showed a 50 per cent increase over the range of the 'cold models.

AD-636 114 **Field 21E, 21H, 20D**
CFSTI Prices: HC$1.60 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
ATHODYD FIELD TEST NO. I.
Feb 45, 20p Bumblebee-4, CM-25
Research supported in part by Bureau of Naval Weapons, Washington, D. C.

Descriptors: (*Ramjet test vehicles, Flight testing), (*Jet engines, Flight testing), Models (Simulations), Launching, Supersonic characteristics, Tables, Experimental data.

Identifiers: Athodyds.

These units are not regarded as prototypes of a complete Bumblebee, but are designed primarily to give data on propulsion and drag at supersonic speeds. This test involved: (a) A trial of procedure for launching an athodyd by use of four 5 inch HVAR rocket motors. Speed exceeding 1500 ft/sec was obtained, and launching was satisfactory in all respects. (b) A determination of supersonic drag for a dummy athodyd. A drag coefficient was found to be 0.5 in reasonable agreement with expectations. An appendix gives a summary of numerical data. The firing, which took place at Island Beach, New Jersey, involved two rounds on February 16 and three rounds on February 18. (Author)

PB-170 573 **Field 21E, 1B**
CFSTI Prices: HC$6.00 MF$0.75
Western Co. of North America, Dallas, Tex. Research Div.
FEASIBILITY STUDY OF TURBINE FUEL GELS FOR REDUCTION OF CRASH FIRE HAZARDS.
Final rept.
by Ken Posey Jr, and Richard Schleicher. Feb 66, 62p
Contract FA-64-WA-5053
FAA-ADS-62

Descriptors: (*Solid jet engine fuels, Feasibility studies), (*Aviation fuels, Gels), (*Gels, Aviation fuels), (*Fuel additives, Gels), Aviation safety, Turboprop engines, Amides, Flammability, Flame propagation, Freezing point, Ignition.

Identifiers: Coco hydroxybutyramides, Gelled fuels, Thickening agents.

Several additives for gelling turbine fuel were studied and tested to predict (1) their ability to reduce or prevent fuel fire in aircraft crashes and (2) their ability to maintain the turbine engine quality of the fuel. An additive known as N-coco-gamma-hydroxybutyramide (CHBA) was found to give a strong, solid gel when mixed in the ratio of 1.5 percent to the weight of the fuel. Laboratory scale impact tests in the presence of an open flame were made of several types of gels. The CHBA gave the best results and reduced the amount of flame generated by 85.2 percent as compared to ungelled fuel. Flame propagation rate on the surface of the gel was less by 96.7 percent. This gel is easily liquefied by heating it to 130F. Chemical and physical tests of the CHBA liquefied gel indicate that it meets turbine engine fuel requirements in all respects except freezing point, which is necessarily high because of the solid nature of the gel. Five gallons of liquefied CHBA gel were burned in a 0.75 gallon per hour standard commercial oil burner having a nozzle with a 60 degree cone orifice. Ignition was instantaneous and the material was visually observed to burn with a smooth, steady flame without leaving deposits or causing corrosion. In a separate test, the solid gel itself was pumped to the nozzle with a gear pump. It burned in the same manner as the liquefied gel. (Author)

AD-446 233 **See Field 13A**

AD-474 312 **See Field 14B**

AD-635 640 **See Field 1C**

AD-636 111 **See Field 20D**

21F. NUCLEAR PROPULSION

PB-170 663 **See Field 13J**

21G. RECIPROCATING ENGINES

AD-635 833 **Field 21G**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
THE BUMBLE-BEE.
by Z. Buzek, and K. Masojidek. 27 May 66, 11p
FTD-HT-66-190
TT-66-61792
Unedited rough draft trans. of Letectvi-Kosmonautika (Czechoslovakia) n11 p350-2 1965.

Descriptors: (*Aircraft engines, Construction), (*Internal combustion engines, Construction), Aircraft industry, Czechoslovakia, USSR.

The report describes the M462 engine.

21H. ROCKET MOTORS AND ENGINES

N66-16087 **Field 21H**
CFSTI Prices: HC$6.00 MF$1.50
Bell Aerosystems Co., Buffalo, N. Y.
A STUDY OF PERSONNEL PROPULSION DEVICES FOR USE IN THE VICINITY OF THE MOON, VOLUME I.
by R. Ames, N. Economou, J. Hodan, R. Kaiser, and J. Mark. Jan 66, 275p
Contract NAS1-4098
NASA-CR-365

Descriptors: *Lunar launch, *Performance characteristics, *Personnel propulsion system.

For abstract, see T 66 17.

N66-16153 **Field 21H**
CFSTI Prices: HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
FILL VALVE DEVELOPMENT FOR THE ADVANCED LIQUID PROPULSION SYSTEM (ALPS).
by W. F. MacGlashan Jr. 1 Feb 66, 27p JPL-TR-32-875
Contract NAS7-100
NASA-CR-69918

Descriptors: *Control valve, *Liquid propellant, *Manual control, *Fuel valve, *Propulsion system.

N66-18022 **Field 21H**
CFSTI Prices: HC$4.00 MF$0.75
Atlantic Research Corp., Alexandria, Va.
STUDY OF PROPELLANT VALVE LEAKAGE IN A VACUUM. PHASE I.
Rept for 7 Jun-24 Nov 65.
by J. P. Copeland, R. D. Giff, J. A. Simmons, and J. M. Spurlock. 1965, 117p
Contract NAS9-4494
NASACR-65225

Descriptors: *Frozen flow, *Fuel valve, *Freezing, *Leakage, *Liquid propellant.

N66-18168 **Field 21H**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
IMPULSE AND THRUST TEST OF A SUBLIMATING-SOLID MICROPROPULSION SYSTEM.
by R. W. Forsythe. Mar 66, 26p NASA-TN-D-3245

Descriptors: *Impulse, *Sublimation, *Microthrust, *Solid propellant, *Thrust.

N66-18315 **Field 21H**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
A THEORETICAL STUDY ON THE EFFECT OF EXPANSION-TUBE PERFORMANCE OF AREA CHANGES AT PRIMARY AND SECONDARY DIAPHRAGM STATIONS.
by L. B. Callis Jr. Mar 66, 72p NASA-TN-D-3303

Descriptors: *Expansion, *Viscous flow, *Diaphragm, *Divergent nozzle, *Supersonic flow.

N66-18324 Field 21H
CFSTI Prices: HC$3.00 MF$0.50
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
STUDY FOR IMPROVEMENT OF GROUND TEST, INSTRUMENTATION SYSTEMS, AND METHODS-NEW METHODS FOR STAGE PROPELLANT TANK PROOF TESTING.
Final rept. 2 Apr-1 Dec 65.
by J. H. Burson III. 1965, 56p
Contract NAS8-20110
NASA-CR-70583

Descriptors: *Propellant tank, *Slurry, *Hydrostatics.

SC-CR-66-2015 Field 21H
CFSTI Prices: HC$2.00 MF$0.50
TRW Systems, Redondo Beach, Calif.
BOOSTER ROCKET ALTITUDE ABORT PROGRAM.
Quarterly progress rept for 4 Jan 1966.
by R. S. Ottinger, and L. J. Van Nice. 1966, 42p
Contract AT (29-1)-789

Descriptors: (*Booster motors, Abort), (*Abort, Booster motors).

For abstract, see N 20 15.

AD-467 050 See Field 13H

AD-636 114 See Field 21E

AD-636 165 See Field 19G

21I. ROCKET PROPELLANTS

AD-409 123 Field 21I, 20K
CFSTI Price: HC$1.50
Southwest Research Inst., San Antonio, Tex.
STUDIES OF INTERNAL DISPLACEMENTS IN SOLID PROPELLANT GRAINS. (EVALUATION OF PHENOMENOLOGICAL RELATION FOR VISCOELASTIC MATERIALS).
by E. Z. Stowell, L. U. Rastrelli, and B. J. Pape.
31 May 63, 32p
Contract Nonr-3363 (00)
Projs. 1043-3, NR-064-051

Descriptors: (*Viscoelasticity, Solid rocket propellants), (*Solid rocket propellants, Mechanical properties), (*Propellant grains, Viscoelasticity), Stresses, Creep, Strainin (Mechanics), Temperature, Equations, Polyethylene plastics.

The purpose of the study was to demonstrate the applicability of a phenomenological relation between stress, strain rate and temperature in describing the behavior of viscoelastic materials, in general, and solid propellants in particular. The basic relation and its specific equations associated with various testing conditions are discussed. The procedure was to extract from the literature those test data which would not only provide the required material constants, but at the same time permit an evaluation of the relation's range of applicability. Although the majority of the data uncovered left much to be desired in the way of completeness (from the viewpoint of utilization in this evaluation), nevertheless, it was possible to detect certain encouraging trends. The manner in which the available data were utilized and the interpretive conclusions are presented. (Author)

N66-17904 Field 21I
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
SIMULATED NUCLEAR HEATING OF LIQUID HYDROGEN IN A PROPELLANT TANK.
by J. W. Gauntner, and S. C. Huntley. Mar 66, 30p NASA-TN-D-3328

Descriptors: *Liquid hydrogen, *Nuclear heat, *Propellant tank.

N66-18154 Field 21I
CFSTI Prices: HC$2.00 MF$0.50
Canadian Armament Research and Development Establishment, Valcartier (Quebec).
REMOTE ADDITION OF POLYURETHANE ALUMINUM SLURRIES TO PROPELLANT MIXERS.
by G. L. Duchesne. Nov 65, 35p CARDE-TN-1686/65

Descriptors: *Physical property, *Chemical property, *Composite propellant, *Powdered aluminum, *Viscous flow.

AD-635 788 See Field 11I

AD-635 825 See Field 7D

AD-636 181 See Field 19A

22A. ASTRONAUTICS

AD-635 962 Field 22A
CFSTI Prices: HC$2.00 MF$0.50
Boeing Scientific Research Labs., Seattle, Wash. Plasma Physics Lab.
ELECTRICAL HAZARDS OF DOCKING IN SPACE.
by J. E. Drummond, and D. J. Nelson. Apr 66, 46p D1-82-0523
Also available from the authors.

Descriptors: (*Spacecraft docking, *Electrostatics), Electric currents, Plasma sheath, Satellites (Artificial), Astronauts, Pressure suits, Thermionic emission, Voltage, Plasma medium, Hazards.

If two earth satellites are joined by a conductor more than a few meters long the E.M.F. generated by its cutting the earth's magnetic field can set up an electrical current. The return path of the current is through the magnetized plasma surrounding the earth (approx. 1 ohm) and the sheath surrounding the lower (negative) satellite. Calculations are presented of the length of conductor necessary to cause this current to exceed the 'limit of physical endurance' of an astronaut attempting to join the two satellites. Should an intermittent connection exist between an astronaut and a single satellite, sufficient alternating component current could flow through the collection area of his suit to exceed the 'let go' current of his muscles. Should a hot spot develop on an astronaut's suit or equipment (while he is below his satellite) so that thermionic emission shorts his sheath, the current can exceed one ampere. Partial calculations based on estimated mobilities of small solid particles in rocket exhaust suggest that the limiting potential of a vehicle in the shadow of the moon may approach a million volts. If docking occurred shortly after a power maneuver, as much as a kilojoule of energy could then be dissipated in the ensuing discharge and welding action. (Author)

AD-636 270 Field 22A, 5I
CFSTI Prices: HC$2.00 MF$0.50
General Precision, Inc., Riverdale, Md. Link Group.
VIRTUAL IMAGE DISPLAY FOR SPACE FLIGHT SIMULATOR.
Final rept., May 64-Jan 66.
by T. P. Neuberger, W. E. Myles, and U. W. Ludwig. Apr 66, 45p
Contract AF 33(615)-1826
Proj. AF-7184
Task 718401
AMRL-TR-66-58

Descriptors: (*Space flight, Flight simulators), (*Television display systems, *Flight simulators), Images, Display systems, Servomechanisms, Astronautics, Training devices, Man-machine systems, Human engineering.

This report describes the addition of virtual display imagery to a spacecraft rendezvous and docking simulator. The virtual image display is an optical system which accepts inputs from two image generators and produces a superimposed, virtual image. The major components of the system are a window display, two wide angle rear projection screens, a beamsplitter, a screen drive servo mechanism, and a television projection system. Installation and alignment were accomplished by positioning and leveling the basic structure, attaching the projection enclosures, and installing the window display and projection equipment. Basic operation and performance characteristics, including the relationships of the field of view to the screen size, and the signal voltage to the range, are provided in the report. Recommendations for future improvements in the system, including expansion of the angular field of view and improvement of resolution and brightness, are also given. (Author)

N66-14751 Field 22A
CFSTI Prices: HC$1.00 MF$0.50
MRD Div. General American Transportation Corp., Niles, Ill.
LUNAR SURVEY PROBE SENSOR STUDY.
Summary rept.
17 Jun 65, 20p MR-1272-2
Contract NAS9-3731
NASA-CR-65191

Descriptors: *Landing site, *Lunar excursion module (Lem), *Sensor.

For abstract, see T 66 17.

N66-15308 Field 22A
CFSTI Prices: HC$2.00 MF$0.50
IIT Research Inst., Chicago, Ill. Astro Sciences Center.
MISSIONS TO THE COMETS.
by F. Narin, P. M. Pierce, and D. L. Roberts. Dec 65, 41p M-9
Contract NASr-65 (06)
NASA-CR-69249

Descriptors: *Launch vehicle, *Space mission.

N66-15541 Field 22A
CFSTI Prices: HC$3.00 MF$0.75
Space Technology Labs., Inc., Redondo Beach, Calif.
STUDY OF UNMANNED SYSTEMS TO EVALUATE THE MARTIAN ENVIRONMENT. VOLUME II-EXPERIMENTS.
by P. Dergarabedian, and R. L. Sohn. 23 Sep 65, 94p STL-5303-6014-TU-000
Contract NAS2-2478
NASA-CR-68741

Descriptors: *Manned space flight, *Mars environment, *Space mission, *Spacecraft design, *Unmanned spacecraft.

N66-15542 Field 22A
CFSTI Prices: HC$1.00 MF$0.50
Space Technology Labs., Inc., Redondo Beach, Calif.
STUDY OF UNMANNED SYSTEMS TO EVALUATE THE MARTIAN ENVIRONMENT. VOLUME IV-SUMMARY.
by P. Dergarabedian, and R. L. Sohn. 23 Sep 65, 24p STL-5303-6016-TU-000.
Contract NAS2-2478
NASA-CR-68743

Descriptors: *Spacecraft design, *Unmanned spacecraft, *Manned space flight, *Mars environment.

N66-15977 Field 22A
CFSTI Prices: HC$1.00 MF$0.50
Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.

BASIC STUDIES IN SPACE VEHICLE ATTITUDE CONTROL.
Semiannual status report. no. 9.
by R. H. Cannon Jr, and I. Flugge-Lotz. Dec 65, 21p
Grant NsG-133-61
NASA-CR-69657

Descriptors: *Mars spacecraft, *Satellite control, *Space vehicle control, *Attitude control.

N66-16151 **Field 22A**
CFSTI Prices: HC$3.00 MF$0.75
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE MARINER II MICROWAVE RADIOMETER EXPERIMENT.
by D. E. Jones. 1 Jan 66, 73p JPL-TR-32-722
Contract NAS7-100
NASA-CR-69916

Descriptors: *Mariner II space probe, *Microwave radiometer, *Planetary surface, *Venus atmosphere.

N66-16163 **Field 22A**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
THE ELECTROMAGNETIC TORQUES ON SPHERICAL EARTH SATELLITES IN A RAREFIED PARTIALLY IONIZED ATMOSPHERE.
by F. Hohl. Feb 66, 66p NASA-TR-R-231

Descriptors: *Polar orbit, *Echo II satellite, *Electromagnetic field, *Satellite rotation.

N66-16597 **Field 22A**
CFSTI Prices: HC$1.00 MF$0.50
Michigan Univ., Ann Arbor.
INVESTIGATION OF GALACTIC AND PLANETARY RADIO ASTRONOMY.
Semiannual status rept. no. 3, Jan-Jun 65.
by F. T. Haddock. Jan 66, 14p
Grant NsG-572
NASA-CR-70152

Descriptors: *Photochemistry, *Planetary atmosphere, *Electron density profile, *Radio astronomy.

N66-17247 **Field 22A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
LONG-TERM MOTION OF A LUNAR SATELLITE.
by F. A. Frost. Oct 65, 29p NASA-TM-X-55374, X-547-65-388

Descriptors: *Harmonic analysis, *Oblateness, *Orbit calculation, *Lunar satellite.

N66-18412 **Field 22A**
CFSTI Prices: HC$3.00 MF$0.75
Lockheed Missiles and Space Co., Sunnyvale, Calif.
ASTEROID BELT AND JUPITER FLYBY STUDY.
Bimonthly progress rept. no. 2, 15 Sep-30 Oct 64. 12 Nov 64, 99p LMSC-M-49-64-3
Contract NAS7-100
NASA-CR-70586

Descriptors: *Jupiter (Planet), *Asteroid, *Flyby mission, *Trajectory analysis.

AD-462 345 **See Field 22B**

AD-635 575 **See Field 22C**

22B. SPACECRAFT

AD-462 345 **Field 22B, 22A**
CFSTI Price: HC$3.00
Royal Aircraft Establishment, Farnborough (England).
TABLE OF THE ARTIFICIAL EARTH SATELLITES LAUNCHED IN 1957-64.
Technical rept.
by D. G. King-Hele, and Eileen Quinn. Feb 65, 83p TR-65019

Descriptors: (*Satellites (Artificial), Catalogs), Launch vehicles (Aerospace), Specifications, Orbital trajectories, Astronautics, Tables.

All known artificial satellites launched before 1 January 1965 are listed chronologically. Lifetime, weights, dimensions and orbital details are given for instrumented satellites and their final-stage rockets. Other fragments from satellites are listed without these details. The methods used in compiling the Table are described. (Author)

AD-635 632 **Field 22B, 20D**
CFSTI Prices: HC$5.00 MF$1.00
Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
INTERFACIAL INSTABILITY OF LIQUID LAYERS ON ELASTIC SURFACES.
by Robert Dan Smith. Mar 66, 178p SUDAAR-259
Contract DA-31-124-ARO-D-223
Proj. DA-20010501B-700

Descriptors: (*Fluid mechanics, *Surface tension), (*Elasticity, Surfaces), Dynamics, Flexible structures, Spacecraft.

The stability criteria associated with representations, of liquid layers which are in contact with flexible surfaces, are investigated theoretically by means of a linear vibration analysis. Such representations serve as mathematical models for situations involving the consideration of the stability of either a liquid stored in the elastic container of a space vehicle operating under low gravity conditions, or of the liquid phase of a material which is undergoing ablation from a flexible heat shield. The representation of the liquid layer consists of an incompressible, inviscid fluid which is subjected to a net unidirectional body force of constant intensity g and which is stored in a two-dimensional channel having a flexible floor. Irrotational flow is assumed and the cross section of the channel is restricted to the cases of a rectangle and the sector of an annulus. The equilibrium liquid-gas interface, in which the effect of surface tension is taken into account, is assumed flat for the rectangular case and to constitute a portion of a circular cylinder in the annular case. In the rectangular case the flexible floor is characterized as a uniform thin flat plate with zero in-plane edge restraint.

AD-635 677 **Field 22B, 8N**
CFSTI Prices: HC$2.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
REDUCTION OF ERRORS IN MAGNETIC ASPECT SENSORS BY A SYSTEM OF GROUND CALIBRATION.
Technical rept.
by C. T. Farr, and E. A. R. Anstey. Mar 66, 34p TR-66092

Descriptors: (*Sounding rockets, *Magnetometers), Errors, Reduction, Calibration, Signal-to-noise ratio, Transducers, Altitude, Magnetic properties, Telemeter systems, Great Britain.

The report discusses the limitations and sources of error introduced into magnetic aspect sensors when installed in a sounding rocket. Typical values of the errors resulting from the magnetic properties of the rocket and its associated electromagnetic instrumentation are given. An attempt to reduce the errors by pre-flight calibration of the rocket head is discussed, and the techniques employed in the method given. Other methods by which the errors may be reduced are indicated. Results obtained from the ground measurements are presented and from these it is concluded that the procedure allows the magnetometer data to be corrected. so that measurements give the magnitude and direction of the applied field with an rms vector error of less than 0.0005 oersteds. (Author)

AD-635 957 **Field 22B**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
ORBITAL PARAMETERS OF STAR-RAD (1962 BETA KAPPA) FOR 19 SEPTEMBER TO 6 OCTOBER 1965.
Technical rept.
by R. J. Tayler. Mar 66, 13p TR-66102

Descriptors: (*Meteorological satellites, *Orbital trajectories), Motion, Analysis.

Identifiers: Star-rad.

196 observations of the satellite STAR-RAD were used to determine its orbit at intervals of 25 nodes between 19 September and 6 October 1965. The work was done as a supplement to a previous determination of this satellite's orbit for the years 1962 to 1964. (Author)

AD-636 172 **Field 22B, 14E**
CFSTI Prices: HC$2.60 MF$0.50
RAND Corp., Santa Monica, Calif.
LUNAR EXPLORATION BY PHOTOGRAPHY FROM A SPACE VEHICLE.
by Merton E. Davies. 5 Mar 59, 24p P-1671

Descriptors: (*Lunar probes, *Spacecraft cameras), (*Photographic equipment, Lunar probes), Spacecraft, Cameras, Circumlunar trajectories, Moon, Aerial trajectories.

The paper describes a camera which, as the payload of an early space vehicle, could photograph the moon. The resulting pictures would be superior to those obtained either by telescope, such as the 200-in. Mt. Palomar telescope or by television camera, such as those carried by Pioneers I and III. The film would be returned to earth in a recoverable capsule. (Author)

N66-15540 **Field 22B**
CFSTI Prices: HC$5.00 MF$1.00
Space Technology Labs., Inc., Redondo Beach, Calif.
STUDY OF UNMANNED SYSTEMS TO EVALUATE THE MARTIAN ENVIRONMENT. VOLUME III-UNMANNED SPACECRAFT DESIGN.
by P. Dergarabedian, and R. L. Sohn. 23 Sep 65, 152p STL-5303-6015-TU-000
Contract NAS2-2478
NASA-CR-68742

Descriptors: *Manned space flight, *Mars environment, *Unmanned spacecraft, *Space mission, *Spacecraft design.

For abstract, see T 66 17.

N66-15543 **Field 22B**
CFSTI Prices: HC$7.00 MF$1.50
Space Technology Labs., Inc., Redondo Beach, Calif.
STUDY OF UNMANNED SYSTEMS TO EVALUATE THE MARTIAN ENVIRONMENT. VOLUME I-SENSITIVITY ANALYSIS.
by P. Dergarabedian, and R. L. Sohn. 23 Sep 65, 300p STL-5303-6013-TU-000
Contract NAS2-2478
NASA-CR-68740

Descriptors: *Manned space flight, *Mars environment, *Space mission, *Spacecraft design, *Unmanned spacecraft.

N66-16017 **Field 22B**
CFSTI Prices: HC$5.00 MF$1.50
Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile and Space Systems Div.

A FEASIBILITY STUDY OF HEAD-END STEERING FOR A SIMPLIFIED MANNED SPACE VEHICLE.
by G. M. Fuller. Dec 64, 228p SM-48152
Contract NAS1-4149
NASA-CR-66020

Descriptors: *Launch vehicle, *Manned spacecraft, *Rocket steering motor, *Steering.

N66-16149 **Field 22B**
CFSTI Prices: HC$4.00 MF$1.00
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
RANGER VIII AND IX. PART I. MISSION DESCRIPTION AND PERFORMANCE.
31 Jan 66, 132p JPL-TR-32-800
Contract NAS7-100
NASA-CR-69914

Descriptors: *Atlas agena launch vehicle, *Deep space instrumentation facility (DSIF), *Ranger IX lunar probe, *Subsystem, *Ranger VIII lunar probe.

N66-16150 **Field 22B**
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MOTOR-DRIVEN MECHANISMS FOR SPACE FLIGHT APPLICATIONS.
by E. L. Floyd. 15 Feb 66, 19p JPL-TR-32-866
Contract NAS7-100
NASA-CR-69915

Descriptors: *Mariner space probe, *Control system, *Scanning device.

N66-17344 **Field 22B**
CFSTI Prices: HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
VOYAGER PROJECT.
Progress rept. 16 Dec 64-15 Jan 66.
1 Feb 66, 34p VPPR-12
Contract NAS7-100
NASA-CR-70386

Descriptors: *Data storage, *Guidance+ control, *Propulsion system, *Telecommunication, *Voyager project.

N66-18085 **Field 22B**
CFSTI Prices: HC$1.00 MF$0.50
Defence Research Telecommunications Establishment, Ottawa (Ontario). Electronics Lab.
TELEMETRY AND COMMAND SYSTEMS FOR THE CANADIAN IONOSPHERIC SATELLITE.
by R. J. Bibby, C. A. Franklin, and R. F. Sturrock. Dec 65, 22p DRTE-1157
Presented at the Intern. Telemetering Conf., London, Sep. 23-27, 1963.

Descriptors: *Alouette satellite, *Command system, *Performance characteristics, *Satellite communication, *Telemetry.

N66-18130 **Field 22B**
CFSTI Prices: HC$2.00 MF$0.50
National Research Council of Canada, Ottawa (Ontario). Radio and Electrical Engineering Div.
SOUNDING ROCKET LAUNCHING AT CHURCHILL RESEARCH RANGE, NOVEMBER 1964 (ROCKET AA-II-37).
by F. V. Cairns, and K. A. Steele. Apr 65, 47p ERB-708

Descriptors: *Rocket firing, *Sounding rocket, *Black Brant II missile.

N66-18466 **Field 22B**
CFSTI Prices: HC$2.00 MF$0.50
General Dynamics/Astronautics, San Diego, Calif.
CENTAUR/SURVEYOR SEPARATION SYSTEM VALIDATION TEST.
by R. L. Deweese. 19 Mar 65, 37p Rept. no. 55A-4173
Contract NAS3-3232
NASA-CR-54417

Descriptors: *Centaur launch vehicle, *Jettison system, *Separation, *Surveyor project, *Weightlessness simulation.

N66-18467 **Field 22B**
CFSTI Prices: HC$3.00 MF$0.75
General Dynamics/Convair, San Diego, Calif.
STITCHED FOAM THERMAL INSULATION PROTECTION SYSTEM FOR THE LH2 TANK WALL OF THE CENTAUR FLIGHT VEHICLE.
Progress rept.
by H. Ruscigno. 30 Apr 65, 77p GD/C-BTD-64-078
Contract NAS3-3232
NASA-CR-54418

Descriptors: *Foamed material, *Insulating material, *Jettison system, *Thermal insulation, *Polyurethane foam.

N66-18468 **Field 22B**
CFSTI Prices: HC$2.00 MF$0.50
General Dynamics/Astronautics, San Diego, Calif.
ATLAS-CENTAUR AC-5 ANALOG/DIGITAL LOAD REDUCTION AUTOPILOT STUDY.
by R. Harris. 13 Feb 64, 40p GD/A-BTD-64-058
Contract NAS3-3232
NASA-CR-54487

Descriptors: *Autopilot, *Digital technique, *Load factor, *Atlas centaur lanuch vehicle, Bending moment.

AD-464 389 **See Field 22C**

AD-471 333 **See Field 13M**

AD-635 604 **See Field 4A**

AD-635 815 **See Field 17B**

AD-635 863 **See Field 4B**

AD-636 108 **See Field 4A**

22C. SPACECRAFT TRAJECTORIES AND REENTRY

AD-464 389 **Field 22C, 22B**
CFSTI Price: HC$6.00
Royal Aircraft Establishment, Farnborough (England).
ON THE MOTION OF NEARLY SYNCHRONOUS SATELLITES.
Technical rept.
by R. R. Allan. Dec 64, 27p TR-64078

Descriptors: (*Synchronous satellites, Equatorial orbit trajectories), Gravity, Celestial mechanics, Equations of motion, Astronautics, Great Britain.

Identifiers: Orbit geodesics.

The longitudinal forces due to the longitude-dependent part of the Earth's gravitational potential can have considerable effects on nearly synchronous satellites. As a preliminary the special case of the circular equatorial orbit is considered. An approximate solution is given for the motion under the combination of all tesseral harmonics, and the relation to the Jacobi integral is discussed. For general orbits the disturbing function for the combination of all tesseral harmonics is developed in terms of the usual elliptic elements and the resonant terms identified and located. With a suitable definition of the mean longitude, it is shown that the motion in longitude relative to the Earth is equivalent to that of a particle moving in a one-dimensional potential, provided only that the eccentricity is small. (Author)

AD-468 532 **Field 22C**
CFSTI Prices: HC$6.00 MF$0.75
Restone Scientific Information Center, Redstone Arsenal, Ala.
SATELLITE ORBIT DETERMINDATION. A BIBLIOGRAPHY.
by Dale Denham. 23 Jun 65, 126p RSIC-415

Descriptors: (*Satellite tracking systems, Bibliographies), Satellites (Artificial), Orbital trajectories, Position finding, Radar tracking, Data processing systems, Space surveillance systems.

The cited references pertain to the area of 'Satellite Orbit Determination.' This bibliography covers the following: (1) Methods to use and combine tracking data from radar and other tracking systems for orbit determination; (2) the influence of tracking station location, number of stations, and time of tracking on the accuracy of orbit determination. In addition to the above, the cited references cover analysis and simulation of orbits; mathematics and parameters of orbits; theory and techniques; prediction and accuracies; programming and computers; error analysis; evaluation of ground coverage; systematic errors; airborne platforms; space dynamics; self-contained orbit determination techniques; and space-time. (Author)

AD-635 575 **Field 22C, 22A**
CFSTI Prices: HC$3.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
EQUATIONS OF THE MOTION OF AN EARTH'S SATELLITE, TAKING INTO ACCOUNT ATMOSPHERIC RESISTANCE.
by K. G. Valeev. 1966, 10p ACIC-TC-1085
TT-66-61778
Uravneniya dvizheniya sputnika Zemli s uchetom soprotivleniya atmosphery, trans. of Prikladnaya Matematika i Mekhanika (USSR), v29 n6 p1100-4 1965.

Descriptors: (*Satellites (Artificial), Orbital trajectories), Gravity, Perturbation theory, Equations of motion, Astronautics, USSR.

For abstract, see T 66 17.

AD-635 684 **Field 22C**
CFSTI Prices: HC$2.00 MF$0.50
Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
MINIMUM-FUEL TRANSFERS BETWEEN COAXIAL ELLIPSES, BOTH COPLANAR AND NONCOPLANAR.
by C. Byron Winn. Aug 65, 38p SUDAER-243
Contract AF 33 (615)-1411
Proj. AF-5102
Task 510215
AFAL-TR-65-276

Descriptors: (*Fuel consumption, *Transfer trajectories), (*Energy management, Space flight), Optimization.

This report presents the solutions for the minimum fuel transfers between coaxial ellipses, both coplanar and noncoplanar. These problems are unusual in that the optimal solutions can be obtained analytically. This report merely presents some of the results that have been obtained; the derivations and proofs have been omitted. (Author)

AD-635 685 **Field 22C**
CFSTI Prices: HC$2.00 MF$0.50
Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
DIRECT DETERMINATION OF SATELLITE COORDINATE PERTURBATIONS BY THE VON ZEIPEL METHOD.

by Juris Vagners. Nov 65, 41p SUDAER-252
Contract AF 33 (615)-1411
Proj. AF-7277
AFAL-TR-66-196

Descriptors: (*Perturbation theory, *Orbital trajectories), Satellites (Artificial), Harmonic analysis, Geophysics.

Identifiers: von Zeipel's method.

By utilizing the canonical variables (R, G, H, r, u, h) of Hill, the in-plane variations in a satellite's coordinates are obtained in a simple manner from the conventional generating functions of the von Zeipel procedure. The generating functions are extended and convenient expressions are found for the radius, radial velocity and the central angle, taking into account the first-order periodic influences of any harmonic in the expansion for the Earth's gravitational field. These expressions are non-singular for zero eccentricity orbits but do not apply for zero inclination orbits, orbits at critical inclination nor for orbits in a state of resonance with the tesseral harmonics. (Author)

AD-635 720 **Field 22C**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
TABLE OF SPACE VEHICLES LAUNCHED IN 1958-65.
Technical rept.
by H. Hiller. Mar 66, 13p TR-66103

Descriptors: (*Spacecraft, Trajectories), Tables, Great Britain.

All known space vehicles launched before 1 January 1966, which are not close-Earth satellites, are tabulated here. The Table is divided into two sections, under the headings (A) Heliocentric orbits and (B) Geocentric and Selenocentric orbits. Section A is a list of space vehicles which finally orbit round the Sun, while Section B is for space vehicles which remain within the dominance of the gravitational attraction of the Earth-Moon system. This Table of Space Vehicles is complementary to the R.A.E. Table of Artificial Earth Satellites. (Author)

AD-635 888 **Field 22C**
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
TRACKING STATION COORDINATES AND NON-ZONAL HARMONICS DERIVED FROM TWO SATELLITES.
by R. R. Newton, and R. B. Kershner. Mar 63, 17p TG-486
Contract NOw-62-604-c

Descriptors: (*Satellite tracking systems, *Orbital trajectories), Errors, Geophysics, Harmonic analysis, Perturbation theory.

Using data from the satellites 1961 omicron 1 and 1961 alpha eta 1, the authors deduced values for the non-zonal harmonics having indices (2,2), (4,1), (4,2), and (4,3). Deducing these harmonics required the simultaneous revision of the coordinates of six tracking stations. (Author)

AD-635 918 **Field 22C**
CFSTI Prices: HC$3.00 MF$0.50
Ritchie, Inc., Dayton, Ohio.
PREDICTOR DISPLAY TECHNIQUES FOR ONBOARD TRAJECTORY OPTIMIZATION OF RENDEZVOUS MANEUVERS.
Final rept., Dec 64-Nov 65.
by William K. McCoy Jr, and George G. Frost.
Apr 66, 52p
Contract AF 33 (615)-2353
Proj. AF-7184
Task 718402
AMRL-TR-66-60

Descriptors: (*Optimization, *Rendezvous trajectories), Maneuvering satellites, Display systems, Simulation.

Predictor displays for orbital rendezvous present to the pilot target position, interceptor position, and a continuous prediction of the interceptor trajectory relative to the target. Two experiments using rendezvous predictor displays are reported: (1) a comparison of on-line and off-line predictor techniques, and (2) a comparison of intermittent versus continuous updating of the prediction. All conditions tested yielded successful rendezvous performance. Off-line prediction, where the pilot could, at will, interrogate the predictor without expending fuel, was demonstrated to be significantly better than on-line prediction where the pilot could see only his actual predicted path. Intermittent updating produced no significant degradation of performance with update rates as low as once per 50 seconds. (Author)

AD-635 922 **Field 22C**
CFSTI Prices: HC$1.00 MF$0.50
Aeronautical Chart and Information Center, St. Louis, Mo. Linguistic Section.
STUDIES OF THE MOTION OF ARTIFICIAL LUNAR SATELLITES.
by G. A. Chebotarev, and S. N. Kirpichnikov. Jul 66, 25p ACIC-TC-1082
TT-66-61812
Izuchenie Dvizheniya Iskustvennykh Sputnikov Luny, trans. of Akademiya Nauk SSSR. Institut Teoreticheskoi Astronomii. Byulleten' v10 n2 (115) p109-17 1965.

Descriptors: (*Lunar satellites, *Motion), Satellites (Artificial), USSR.

Conclusions: Equatorial satellites with direct motion. The motion of close lunar satellites is steady, even in the case of orbits with great eccentricities. Unsteadiness appears with the length of the major semiaxis being approximately equal to 15 lunar radii. The polar satellites are less steady than the equatorial satellites with direct motion. Aocording to M.L. Lidov (1963), they are characterized by unsteady motion and fall on the surface of the moon after a relatively small number of revolutions. However, they also can change to a hyperbolic orbit. The equatorial satellites with retrograde motion are more steady than the satellites with direct motion. Unsteadiness appears with the size of the major semiaxis becoming approximately equal to 25 lunar radii. For the sake of comparison, let us indicate that the radius of the sphere of action of the moon is equal to 38 lunar radii. (Author)

N66-15146 **Field 22C**
CFSTI Prices: HC$2.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
THE ORBIT OF TIROS 7 (1963-24 A) FEBRUARY 13-23, 1965.
by D. W. Scott. Oct 65, 26p RAE-TR-65221

Descriptors: *Tiros VII satellite, *Minitrack, *Orbital element.

For abstract, see T 66 17.

N66-15399 **Field 22C**
CFSTI Prices: HC$2.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Experimental Astronomy Lab.
OPTIMUM TRANSFER TO MARS VIA VENUS.
by W. M. Hollister, and J. E. Prussing. Apr 65, 45p RE-16
Grant NsG-254-62
NASA-CR-69348

Descriptors: *Venus, *Earth-Mars rendezvous trajectory, *Flyby mission, *Planetary space flight.

N66-16082 **Field 22C**
CFSTI Prices: HC$1.00 MF$0.50
Honeywell, Inc., St. Paul, Minn. Research Dept.
RESEARCH AND STUDY IN SYSTEM OPTIMIZATION TECHNIQUES.
Quarterly progress rept. no. 2, 14 Feb-14 May 65.
by R. G. Johnson, and D. L. Lukes. 1 Jun 65, 10p
Rept. no. 1546-QR-2
Contract NAS8-5222
NASA-CR-69712

Descriptors: *Matrix algebra, *Motion stability, *Thor launch vehicle, *Trajectory optimization, *Prediction theory.

N66-16088 **Field 22C**
CFSTI Prices: HC$5.00 MF$1.25
Lockheed Missiles and Space Co., Sunnyvale, Calif.
THEORY OF MINIMUM EFFORT CONTROL.
by J. V. Breakwell, H. E. Rauch, and F. F. Tung. Jan 66, 196p
Contract NAS1-3777
NASA-CR-378

Descriptors: *Midcourse guidance, *Interplanetary flight, *Manned space flight, *Optimal control, *Spacecraft guidance.

N66-16962 **Field 22C**
CFSTI Prices: HC$1.00 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
PERTURBATIONS OF SATELLITE ORBITS BY THE GRAVITATIONAL ATTRACTION OF A THIRD BODY.
by M. M. Lewis. Jun 65, 25p RAE-TR-65118

Descriptors: *Perturbation, *Satellite orbit, *Gravitational field.

N66-17249 **Field 22C**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
PRELIMINARY TRAJECTORY ANALYSIS OF A MARS PROBE.
by J. Mc Nellis. Oct 65, 31p NASA-TM-X-55376, X-643-65-390

Descriptors: *Mars probe, *Trajectory analysis, *Voyager project.

N66-17251 **Field 22C**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
TWO REFERENCE APOLLO LUNAR PARKING ORBITS.
by T. P. Timer. Oct 65, 24p NASA-TM-X-55378, X-543-65-399

Descriptors: *Apollo spacecraft, *Lunar orbit, *Orbit perturbation.

N66-17254 **Field 22C**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
LIFETIMES OF HIGHLY ECCENTRIC SATELLITES.
by J. Chiville, and B. E. Shute. Oct 65, 28p
NASA-TM-X-55381, X-643-65-402

Descriptors: *Lifetime, *Lunar perturbation, *Satellite orbit, *Solar gravitational effect.

N66-17259 **Field 22C**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
COMPUTATIONAL PROCEDURE FOR VINTI'S ACCURATE REFERENCE ORBIT WITH INCLUSION OF THE THIRD ZONAL HARMONIC.
by N. L. Bonavito. Oct 65, 24p NASA-TM-X-55386, X-547-65-415

Descriptors: *Positioning, *Gravitational field, *Satellite tracking, *Zonal harmonics.

N66-17260 Field 22C
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
NUMERICAL DETERMINATION OF SHORT PERIOD TROJAN ORBITS IN THE RESTRICTED THREE BODY PROBLEM.
by E. F. Goodrich. Oct 65, 27p NASA-TM-X-55388, X-643-65-420

Descriptors: *Libration, *Orbital calculation, *Three-body problem.

N66-17262 Field 22C
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
INJECTION CONDITIONS FOR LUNAR TRAJECTORIES.
by R. Koleniewicz, and W. Putney. Nov 65, 48p NASA-TM-X-55390, X-643-65-430

Descriptors: *Earth-moon trajectory, *Trajectory analysis, *Geometric factor, *Rocket booster.

N66-17901 Field 22C
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
MIDCOURSE GUIDANCE FOR RETURN FROM THE MOON TO A GEOGRAPHICALLY FIXED LANDING SITE.
by L. S. Cicolani, and J. D. McLean. Mar 66, 43p NASA-TN-D-3318

Descriptors: *Landing site, *Midcourse guidance, *Return-to-earth phase.

N66-17903 Field 22C
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Houston, Tex. Manned Spacecraft Center.
RECURSIVE COMPUTATION OF THE COEFFICIENTS OF THE TIME-DEPENDENT F AND G SERIES SOLUTION OF KEPLERIAN MOTION AND A STUDY OF THE CONVERGENCE PROPERTIES OF THE SOLUTION.
by V. R. Bond. Mar 66, 22p NASA-TN-D-3322

Descriptors: *Recursion formula, *Two-body problem, *Kepler law, *Time dependency.

PB-170 897 Field 22C, 3A
CFSTI Prices: HC$3.00 MF$0.75
Smithsonian Astrophysical Observatory, Cambridge, Mass.
SATELLITE ORBITAL DATA.
Special rept. on Research in Space Science.
by Beatrice Miller. 5 Apr 66, 94p 2-66-16, SAO-SR-209
Grant NsG-87-60
See also PB-170 898.

Descriptors: (*Satellites (Artificial), Orbital trajectories), Astronomical data, Sun, Celestial guidance, Scientific satellites, Tables.

Identifiers: EXPLORER, ANNA, SATURN space vehicle, VANGUARD, ECHO, INJUN III, TELSTAR, RELAY (Satellite), Geophysical satellites.

PB-170 898 Field 22C, 3A
CFSTI Prices: HC$4.00 MF$0.75
Smithsonian Astrophysical Observatory, Cambridge, Mass.
SATELLITE ORBITAL DATA.
Special rept. on Research in Space Science.
by Beatrice Miller. 4 Apr 66, 95p 1-66-1, SAO-SR-208
Grant NsG-87-60

Descriptors: (*Satellites (Artificial), Orbital trajectories), Astronomical data, Sun, Celestial guidance, Scientific satellites, Tables.

Identifiers: EXPLORER, TELSTAR, SATURN space vehicle, VANGUARD, ANNA, RELAY (Satellite), ECHO, INJUN III, Geophysical satellites.

Field-reduced photographs from SAO Baker-Nunn cameras comprise the majority of observations used in computing the orbital data. As opposed to osculating elements, the elements presented are mean elements in the sense that the effects of the short-period perturbations due to the earth's oblateness have been eliminated. SAO mean elements have been derived from observations covering several days and are given in the form of a table. The successive sets of elements are essentially independent of each other. They are dependent in the sense that high-order coefficients in the secular and the long-periodic terms are generally considered as known and as constant for periods of several weeks or months, as dictated by convenience. The times of epoch in the mean elements are reckoned in Julian Days, but for the sake of convenience the number 2400000.5 has been subtracted to provide an abbreviated notation called 'Modified Julian Days,' or 'MJD.' SAO smoothed elements have been derived from observations covering about 2 weeks or more. They are given as functions of time and generally include both secular and periodic terms. (Author)

AD-441 576 See Field 20N

22D. SPACECRAFT LAUNCH VEHICLES AND GROUND SUPPORT

N66-12244 Field 22D
CFSTI Prices: HC$1.00 MF$0.50
Boeing Co., Huntsville, Ala.
ADVANCED SYSTEMS CHECKOUT DESIGN.
Quarterly progress rept. no. 1, 29 Jun - 29 Sep 65. 29 Sep 65, 20p
Contract NAS8-20240
NASA-CR-68102

Descriptors: *Saturn S- IVB stage, *Checkout equipment, *Instrument package, *Saturn V launch vehicle.

N66-13250 Field 22D
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and space Administration, Cocoa Beach, Fla. John F. Kennedy Space Center.
GROUND SUPPORT EQUIPMENT AND LAUNCH INSTALLATIONS AT JOHN F. KENNEDY SPACE CENTER, NASA, FOR THE MANNED LUNAR LANDING PROGRAM.
by R. A. Petrone. 1964, 34p
NASA-TM-X-57026
Prepared for presentation at Intern. Astronautical Congr. (15th), Warsaw 7-12 Sep 64.

Descriptors: *Ground support system, *Launch complex, *Launching facility, *Lunar landing, *Cape Kennedy.

N66-14966 Field 22D
CFSTI Prices: HC$4.00 MF$1.00
Lear Siegler, Inc., Grand Rapids, Mich. Instrument Div.
LAUNCH VEHICLE OPTIMIZATION, PHASE II. VOLUME I. CONCEPT DEVELOPMENT AND APPLICATION.
Final rept.
Sep 65, 131p GRR-65-1089-I
Contract NASw-938
NASA-CR-69197

Descriptors: *Economics, *Launch vehicle, *Program management, *Optimization.

N66-15477 Field 22D
CFSTI Prices: HC$7.20 MF$2.00
Bendix Systems Div, Bendix Corp., Ann Arbor, Mich.
SURVEYOR LUNAR ROVING VEHICLE, PHASE I. VOLUME IV. RELIABILITY.
Final rept.
Apr 64, 420p BSR-903-Vol-4
Contracts NAS7-100, JPL-950656
NASA-CR-69397

Descriptors: *Failure mode, *Reliability, *Surveyor project, *Lunar roving vehicle (LRV), *Mathematical model.

N66-15481 Field 22D
CFSTI Prices: HC$5.00 MF$1.00
GM Defense Research Labs, Santa Barbara, Calif.
SURVEYOR LUNAR ROVING VEHICLE, PHASE I. VOLUME II. APPENDIXES. SECTION IV. RELIABILITY.
Final rept.
23 Apr 64, 163p TR-64-26-Vol-2-Sect-4
Contracts NAS7-100, JPL-950657
NASA-CR-69399

Descriptors: *Hardware, *Reliability, *Spherical shell, *Structural dynamics, *Thin walled shell, *Failure mode, *Lunar roving vehicle (LRV), *Surveyor project.

N66-15482 Field 22D
CFSTI Prices: HC$2.00 MF$0.50
GM Defense Research Labs, Santa Barbara, Calif.
SURVEYOR LUNAR ROVING VEHICLE, PHASE I. VOLUME II-APPENDIXES. SECTION V-ADDITIONAL INFORMATION ON RTE.
Final rept.
23 Apr 64, 30p TR-64-26-Vol-2-Sect-5
Contracts NAS7-100, JPL-950657
NASA-CR-69398

Descriptors: *Lunar roving vehicle (LRV), *Power supply, *Electronics, *Surveyor project.

N66-15483 Field 22D
CFSTI Prices: HC$7.00 MF$2.00
Bendix Systems Div, Bendix Corp., Ann Arbor, Mich.
SURVEYOR LUNAR ROVING VEHICLE, PHASE I. VOLUME III-PRELIMINARY DESIGN AND SYSTEM DESCRIPTION. BOOK 2-VALIDATION OF PRELIMINARY DESIGN.
Final rept.
Apr 64, 373p BSR-903-Vol-3-Bk-2
Contracts NAS7-100, JPL-950656
NASA-CR-69397

Descriptors: *Folding structure, *Surveyor project, *Lunar roving vehicle (LRV), *Mobility.

N66-16145 Field 22D
CFSTI Prices: HC$4.00 MF$1.00
General Electric Co., Daytona Beach, Fla.
STAGE CHECKOUT PLAN.
5 Aug 63, 121p
NASA-CR-69710

Descriptors: *Test program, *Checkout equipment, *Launch vehicle.

★ U.S. GOVERNMENT PRINTING OFFICE : 1966 O—252-087 (5)

CURRENT r & d PROJECTS

01 AERONAUTICS

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00F 211 12 FIELD 22C,20D

FLUID MECHANICAL AND DYNAMICAL PROBLEMS EMANATING FROM HYPERVELOCITY FLIGHT

A. FERRI

AF-AFOSR-0001-63
/65- /

DOD-AIR FORCE

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00F 296 8 FIELD 20D,20K

MASS INST OF TECHNOL, GRADUATE SCHOOL, MASSACHUSETTS

UNSTEADY GASDYNAMIC PROBLEMS RELATED TO FLIGHT VEHICLES

M. T. LANDAHL

AF-AFOSR-0136-65
/65- /

DOD-AIR FORCE

03 ASTRONOMY AND ASTROPHYSICS

****

GH 45 2 FIELD 3A

UNIVERSITY OF ARIZONA, GRADUATE SCHOOL, ASTRONOMY, ARIZONA

CONSTRUCTION OF A 60-INCH LUNAR AND PLANETARY TELESCOPE

G. P. KUIPER

NASR-82
8/64- 7/65

NASA

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GH 310 2 FIELD 3A

RENSSELAER POLYTC INST, GRADUATE SCHOOL, ASTRONOMY, NEW YORK

LABORATORY INVESTIGATION OF THE COMPOSITION AND CHEMICAL BEHAVIOR OF THE ATMOSPHERE OF VENUS

P. HARTECK

NSG-261-62
8/64- 7/65

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GH 327 4 FIELD 3A, 3B

NEW MEX STATE UNIV, GRADUATE SCHOOL, PHYSICS + CHEMISTRY, NEW MEXICO

PHOTOGRAPHIC PATROL AND STUDY OF THE PHYSICAL CONDITIONS ON THE MOON AND PLANETS

C. W. TOMBAUGH, J. C. ROBINSON
B. A. SMITH

NSG-142
4/65- 3/66

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GH 571 2 FIELD 3A, 3B, 4A,18A

MASS INST OF TECHNOL, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF THE INTERPLANETARY MEDIUM AND IN GAMMA-RAY ASTRONOMY

B. B. ROSSI, H. S. BRIDGE, G. W. CLARK
W. L. KRAUSHAAR, A. J. LAZARUS, S. OLBERT
F. SCHERB

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1/65-12/65

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GH 746 2 FIELD 3A, 3B,20F

UNIV OF TEXAS, AUSTIN, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, TEXAS

RESEARCH ON MILLIMETER-WAVELENGTH RADIATION FROM SOLAR BODIES

C. W. TOLBERT

NSG-432
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GH 832 2 FIELD 3A, 3B,20M,20J

HARVARD UNIVERSITY, GRADUATE SCHOOL, ASTRONOMY, MASSACHUSETTS

THEORETICAL AND EXPERIMENTAL STUDIES IN ULTRAVIOLET SOLAR PHYSICS, INCLUDING CONSTRUCTION OF LABORATORY PROTOTYPE FLIGHT EXPERIMENTS

L. GOLDBERG

NSG-438
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GH 977 4 FIELD 3A,20J, 5A

RENSSELAER POLYTC INST, GRADUATE SCHOOL, PHYSICS, NEW YORK

MODELS OF INTERSTELLAR DUST CLOUDS AND EXTINCTION AND POLARIZATION IN THE ULTRAVIOLET

J. M. GREENBERG

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GH 1408 4 FIELD 3A,20C,20I

YALE UNIVERSITY, GRADUATE SCHOOL, ASTRONOMY, CONNECTICUT

STEADY STATE INTERACTION BETWEEN RADIATION AND MATTER IN STELLAR ATMOSPHERES

R. WILDT

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GH 1403 1 FIELD 3A, 5A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW YORK

INVESTIGATIONS OF COSMIC RAYS, NEUTRONS, AND INTERPLANETARY PLASMA IN THE SOLAR SYSTEM

S. A. KORFF

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7/64- 6/65

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GQA 227 1 FIELD 3A, 3B

RADIO ASTRONOMY

A. H. BARRETT, A. *. BARRETT

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DOD-ARMY

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GQA 299 1 FIELD 3C, 5A,20J

GRAVITATION RESEARCH

R. WEISS, H. *. WEISS

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DOD-ARMY

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3QA 305 1 FIELD 3B, 3A, 9*, 9A

RADIO ASTRONOMY - MICROWAVE RADIOMETERS

R. P. RAFUSE, R. *. RAFUSE

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GQA 544 FIELD 3A

SOLAR MICROWAVE RADIO EMISSION

P. KAUFMANN

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DOD-ARMY

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GOF 28 9 FIELD 3A, 3B, 9+, 9A

STANFORD UNIVERSITY, GRADUATE SCHOOL, CALIFORNIA

RADIO ASTRONOMY RESEARCH

R. S. COLVIN

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GOF 104 8 FIELD 3C, 3A,20J, 5A

CAL INST OF TECHNOLOGY, GRADUATE SCHOOL, PHYSICS, CALIFORNIA

STUDIES OF STELLAR COMPOSITIONS AND PROCESSES

J. L. GREENSTEIN

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GOF 109 12 FIELD 3A, 4A, 5A

UNIVERSITY OF CHICAGO, GRADUATE SCHOOL, PHYSICS, ILLINOIS

COSMIC AND SOLAR RADIATION STUDIES AND THEIR ASTROPHYSICAL CONSEQUENCES

J. A. SIMPSON

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04 ATMOSPHERIC SCIENCES

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GH 1029 1 FIELD 4A

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, ILLINOIS

INVESTIGATIONS AND STUDIES OF ELECTRON DENSITY AND COLLISION FREQUENCY IN THE LOWER IONOSPHERE - D AND E REGIONS

S. A. BOWHILL

NSG-511
10/64- 7/65

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GH 1210 1 FIELD 4A, 4B, 5A

UNIV OF TENNESSEE, GRADUATE SCHOOL, PHYSICS, TENNESSEE

INVESTIGATIONS INTO THE REGION OF VARIOUS ATMOSPHERIC GASES

N. M. GAILAR

NASA-P-2-NSG-539
11/64-10/65

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GH 1605 FIELD 4A

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, ILLINOIS

A THEORETICAL AND EXPERIMENTAL STUDY OF THE IONOSPHERE USING RADIO SIGNALS FROM EARTH SATELLITES

G. W. SWENSON, D. B. HODGE, J. F. PHELAN

K. C. YEH

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GOA 323 2 FIELD 4A,20D

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, ENGINEERING MECHANICS, MICHIGAN

INVESTIGATION OF FLUID-MECHANICS PROBLEMS RELATED TO GEOPHYSICAL PHENOMENA

C. S. YIH

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GOF 961 6 FIELD 3A, 4A,20H

UNIV OF LUND, SWEDEN

HIGH ENERGY COSMIC RAY INTERACTION STUDIES

S. VONFRIESEN

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GOF 1111 5 FIELD 20H, 4A,18A,20H

UNIV OF SYDNEY, AUSTRALIA

NUCLEAR INTERACTIONS AT ENERGIES GREATER THAN 1000 BEV

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UNIV OF ADELAIDE, AUSTRALIA

IRREGULARITIES AND MOVEMENTS IN THE IONOSPHERE

B. H. BRIGGS

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GOF 3782 1 FIELD 7D, 4A,20J, 7B

JOHNS HOPKINS UNIV, GRADUATE SCHOOL, CHEMISTRY, MARYLAND

UPPER ATMOSPHERE ION-MOLECULE REACTIONS

W. S. KOSKI

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GOF 4393 FIELD 4A, 8+, 9A

UNIV OF ADELAIDE, AUSTRALIA

IONOSPHERIC AND METEOR OBSERVATIONS WITH LARGE ANTENNA ARRAY

B. H. BRIGGS, W. G. ELFORD

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/65- /

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GOF 4404 FIELD 4A, 8+, 9A

UNIV OF NEWCASTLE UPON, UNITED KINGDOM

RIOMETER STUDIES OF THE INTERRELATIONS OF RADIO NOISE AND ABSORPTION

C. D. ELLYETT

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GOF 4418 FIELD 4A,18A

UNIVERSITY OF BERGEN, NORWAY

X-RAY AND PARTICLE RADIATIONS AT HIGH ALTITUDES IN THE AURORAL ZONE

H. TREFALL

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COLORADO STATE UNIV, SCHOOL OF ENGINEERING, ATMOSPHERIC SCIENCE, COLORADO

EVALUATION OF WEATHER MODIFICATION OPERATIONS

L. GRANT

7/65- 6/66

STATE-COLORADO

05 BEHAVIORAL AND SOCIAL SCIENCES

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GH 1284 1 FIELD 5A

GEORGIA INST OF TECH, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, GEORGIA

INTERDISCIPLINARY RESEARCH GRANT TO GEORGIA TECH

K. O. PICHA, V. CRAWFORD

NSG-657
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GOF 99 7 FIELD 12A

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AIR FORCE SCIENTIFIC RESEARCH BIBLIOGRAPHY

C. R. BROWN

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GOF 4381 FIELD 5A

SUMMER SEMINAR SCIENCE IN THE SIXTIES

J. R. FOOTE

AF-AFOSR-0861-65
/65- /

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06 BIOLOGICAL AND MEDICAL SCIENCES

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GOA 220 1 FIELD 9+, 9A,12A, 9C

COGNITIVE INFORMATION PROCESSING + C OMPUTER RECOGNITION OF SHEET MUSIC

S. J. MASON, M. EDEN, S. +. MASON

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GOA 335 1 FIELD 7C, 7D,20J

UNIV OF MINNESOTA, SCHOOL OF MEDICINE, BIOCHEMISTRY, MINNESOTA

INDUCTION OF CONTRACTILE PROPERTIES IN MACROMOLECULAR SUBSTANCES BY LIGHT

R. E. LOVRIEN

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GOA 439 FIELD 7C, 7D

STATE UNIV N Y STONY, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

FUNDAMENTAL CHEMISTRY FOR THE STUDY OF THE TOPOLOGY OF ACTIVE SITES OF ENZYMES

E. M. KOSOWER

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/65- /

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07 CHEMISTRY

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GAK 1011 1 FIELD 7C, 9+,20J,20C

MICROWAVE SPECTROSCOPY IN THE MILLIMETER REGION

D. M. LARKIN

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10/63- 9/64

AIR FORCE-OFFICE AEROSPACE RESEARCH

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GH 112 2 FIELD 7C, 7D,20M,20L

FLORIDA STATE UNIV, GRADUATE SCHOOL, CHEMISTRY, FLORIDA

STUDY OF CRYSTALLIZATION, CROSSLINKING AND DIMENSIONAL CHANGES DURING THE CRYSTAL-LIQUID PHASE TRANSITION OF ORIENTED POLYMERIC SYST

L. F. MANDELKERN

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3/64- 2/65

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GH 167 4 FIELD 7C, 7D

USDC, NATL BUR STAN, DIST OF COLUMBIA

CONDUCT RESEARCH ON THE INITIATION OF POLYMER DECOMPOSITION BY VACUUMULTRAVIOLET RADIATION

L. A. WALL

NASA-E-4-9-54
10/64- 9/65

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GH 445 2 FIELD 12A,20J, 7B

PURDUE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, INDIANA

HIGH PRECISION SPECTROSCOPY WITH APPLICATIONS TO THE STUDY OF THE ATOMIC SPECTRA OF THE CARBON GROUP

K. L. ANDREW, S. C. BAKER, W. G. BRILL

NSG-301
2/65- 1/66

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GH 1036 1 FIELD 7D

KENT STATE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, OHIO

THEORETICAL AND EXPERIMENTAL STUDIES OF THE MAGNETIC AND MOLECULAR PROPERTIES OF SELECTED COMPOUNDS

J. W. REED

NSG-463
7/64- 6/68

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GH 1405 1 FIELD 20J, 5A

BRANDEIS UNIVERSITY, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

THEORETICAL RESEARCH IN STATISTICAL MECHANICS WITH APPLICATION TO ROTATION PHENOMENA

S. P. HEIMS

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5/65- 4/66

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GPE 1055 FIELD 7C,20M,20J,20D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW YORK

IONIZATION IN THE CONDENSED PHASE

M. P. KALLMANN, W. BRANDT

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2/65- 1/66

AEC-BIOLOGY + MEDICINE

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GPF 35 3 FIELD 7D,20J,20F,20D

UNIV OF KENTUCKY, GRADUATE SCHOOL, CHEMISTRY, KENTUCKY

INFRARED STUDIES OF CHEMISORBED MOLECULES

H. C. ECKSTROM

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GPF 369 3 FIELD 7C, 7D,20J, 7B

DUQUESNE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, PENNSYLVANIA

COMPLEXES IN CHEMISTRY

N. C. LI

AT(30-1)-1922
6/65- 5/66

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GPF 424 3 1 FIELD 7C, 7D, 7A,20J

UNIV OF CAL-RIVERSIDE, GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

STUDY OF METAL CHELATES

D. T. SAWYER, B. BAKER, D. BROOKMAN R. FINGER, G. HARGROVE, F. SCHULTZ

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10/65- 9/66

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GPF 532 3 FIELD 7C, 7D, 7A,18A

PRINCETON UNIVERSITY, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, NEW JERSEY

FISSION FRAGMENT AND FAST NEUTRON ENERGY TRANSFER TO CHEMICAL SYSTEMS

R. C. AXTMANN

AT-30-1-2807
9/65- 8/66

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GPF 707 3 FIELD 7C, 7D, 7A,20J

ILLINOIS INST OF TECH, GRADUATE SCHOOL, CHEMISTRY, ILLINOIS

RADIATION CHEMISTRY

D. G. GARDNER, T. J. NEUBERT

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10/65-10/66

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GPF 808 1 FIELD 7D, 7A,12A,20J

UNIVERSITY OF FLORIDA, SCHOOL OF ENGINEERING, NUCLEAR ENGINEERING, FLORIDA

CHEMICAL STRUCTURAL STUDIES BY NUCLEAR TECHNIQUES

W. H. ELLIS

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3/66- 2/67

AEC-DIVISION OF PHYSICAL RES

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GPF 948 FIELD 7A, 7D,20M, 7B

JOHNS HOPKINS UNIV. GRADUATE SCHOOL, CHEMISTRY, MARYLAND

INTERACTION BETWEEN AND IDENTIFICATION OF IONIC SPECIES IN SOLUTION

J. W. GRYDER

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12/65-11/66

AEC-DIVISION OF PHYSICAL RES

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GPF 962 FIELD 7C, 7D, 7A,20J

MASS INST OF TECHNOL, GRADUATE SCHOOL, CHEMISTRY, MASSACHUSETTS

CHEMICAL KINETICS OF CERTAIN HIGH ENERGY SPECIES

J. DUBRIN, W. FELDER, W. OLLISON

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GQA 270 FIELD 7C, 7D,20M

STANFORD RESEARCH INST, MENLO PARK, CALIFORNIA

COOPERATIVE STUDY OF IDENTITY AND PURITY OF SELECTED ORGANIC COMPOUNDS

R. M. SILVERSTEIN

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GQA 316 FIELD 7C, 7A, 7D,20J

ILLINOIS INST OF TECH, GRADUATE SCHOOL, CHEMISTRY, ILLINOIS

THE NATURE OF INTERMEDIATES IN SURFACE REACTIONS THE MECHANISM OF DEUTEROGENATION

G. V. SMITH

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GQA 317 1 FIELD 7C, 7D, 7A,20J

LOUISIANA ST UNIV A+M, GRADUATE SCHOOL, CHEMISTRY, LOUISIANA

ORGANIC MOLECULAR SOLID STATE PHENOMENOLOGY

S. P. MCGLYNN

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GQA 321 2 FIELD 7C, 7D,20M,20J

UTAH ST UNIV OF AGRIC, GRADUATE SCHOOL, CHEMISTRY, UTAH

THERMOCHEMISTRY OF DAGANIC MOLECULES

R. H. BOYD

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GQA 324 2 FIELD 7C, 7D

OHIO STATE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, OHIO

THE PHOTOCHEMICAL SYNTHESIS OF POLYAZACYCLOBUTANESYSTEMS

M. P. CAVA

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GQA 326 2 FIELD 7C, 7D, 7A, 7B

UNIVERSITY OF IOWA, GRADUATE SCHOOL, CHEMISTRY, IOWA

THE ELECTROLYTIC OXIDATION OF ORGANIC ANIONS IN NON-AQUEOUS SOLVENTS

S. WAWZONEK

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GQA 331 1 FIELD 7C, 7D, 7B

UNIVERSITY OF ILLINOIS, GRADUATE SCHOOL, CHEMISTRY + CHEM ENGIN, ILLINOIS

CHEMISTRY OF BRIDGEHEAD AND VINYL DIAZONIUM SALTS

D. Y. CURTIN

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GQA 332 2 FIELD 7C, 7A, 7D

UNIV OF PENNSYLVANIA, GRADUATE SCHOOL, CHEMISTRY, PENNSYLVANIA

THE ELECTROMAGNETIC ACTIVITY OF PORPHIN DERIVATIVES

P. GEORGE, A. D. ADLER

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GQA 340 1 FIELD 7A, 7D

CHARGE TRANSPORT IN METAL-MOLTEN SALT SOLUTIONS

H. T. DAVIS

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GQA 343 1 FIELD 7C, 7D, 7A

RESEARCH TRIANGLE IN, NORTH CAROLINA

THE PREPARATION AND PROPERTIES OF WELL DEFINED GRAFT COPOLYMERS

V. T. STANNETT

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GQA 346 FIELD 7C, 7D

KANSAS ST UNIV AGR SCI, GRADUATE SCHOOL, CHEMISTRY, KANSAS

STUDIES IN EPOXIDE-CARBONYL REARRANGEMENTS

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GQA 350 FIELD 7C,20J

RENSSELAER POLYTC INST, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

CHEMICAL BONDING IN EXCITED ELECTRONIC STATES

S. C. WAIT

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GQA 357 FIELD 7C, 7D, 7B

UNIVERSITY OF ARIZONA, GRADUATE SCHOOL, CHEMISTRY, ARIZONA

SYNTHESIS OF LADDER POLYMERS

J. E. MULVANEY

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GQA 359 1 FIELD 7C, 7A, 7D

OHIO STATE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, OHIO

SYNTHESIS AND PROPERTIES OF NAPHTHO- AND PHENANTHRAQUINONES

M. S. NEWMAN

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GQA 362 2 FIELD 7C, 7A, 7D,20J

CLEMSON UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, SOUTH CAROLINA

MECHANISM OF THE DECOMPOSITION OF IMIDOYL HALIDES

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GQA 363 2 FIELD 7C, 7D,20M

FLORIDA STATE UNIV, GRADUATE SCHOOL, CHEMISTRY, FLORIDA

THE NATURE OF THE CRYSTALLINE STATE IN POLYMERS

L. F. MANDELKERN

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/65- /

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GQA 415 FIELD 7C, 7D, 7A, 7B

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MECHANISM STUDIES WITH BORON HYDRIDES AND CARBORANES

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DA-ARO-D-31-124-G847
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GQA 416 2 FIELD 7C, 7D, 7A,20K

BRIGHAM YOUNG UNIV, GRADUATE SCHOOL, CHEMISTRY, UTAH

THERMODYNAMIC INVESTIGATION OF CHARGE-TRANSFER COMPOUNDS

J. B. UTT, J. H. GOATES

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GQA 418 2 FIELD 7C, 7D

FRANKLIN INSTITUTE, PENNSYLVANIA

DIFFUSION IN ORGANIC CRYSTALS

M. M. LABES, P. J. REUCROFT

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GQA 420 1 FIELD 7C, 7D,20J

IOWA ST UNIV SCI TECH, GRADUATE SCHOOL, CHEMISTRY, IOWA

BASE-CATALYZED CONDENSATIONS IN AND INVOLVING DIMETHYL SULFOXIDE

G. A. RUSSELL

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GQA 424 1 FIELD 7C, 7A, 7D

TULANE UNIV OF LA, GRADUATE SCHOOL, CHEMISTRY, LOUISIANA

PHOTOCHEMISTRY OF UNSATURATED CARBONYL DERIVATIVES AND RELATED SMALL RING SYSTEMS

G. W. GRIFFIN

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GQA 433 2 FIELD 7C, 7D, 7B

HARSHAW CHEM CO, OHIO

INVESTIGATION OF THE EXISTENCE OF OXYANIONS OF FLUORINE AND NITROGEN AND THE NITROGEN-FLUORINE CATIONS

S. L. HURST

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GQA 437 2 FIELD 7C,21I, 7A, 7D

SOLUTION AND CONDUCTIVITY STUDIES IN FLUORINES CONTAINING LIQUID OXIDIZERS

W. D. ENGLISH

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GQA 438 1 FIELD 7C, 7D, 7A, 7B

SYRACUSE UNIVERSITY, SCHOOL OF FORESTRY, CHEMISTRY, NEW YORK

STUDIES OF REACTIONS OF D ATOMS RADICALS AND SOME ELECTRON-TRANSFER PROCESSES

M. SZWARC

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/65- /

DOD-ARMY

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GQA 440 FIELD 7C, 5A

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SECOND INTERNATIONAL SYMPOSIUM ON ORGANOMETALLIC CHEMISTRY

R. WEST

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DOD-ARMY

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GQA 442 1 FIELD 7C, 7D, 7B

CYCLIZATION OF DIENES DURING THE FREE RADICAL ADDITION OF SMALL MOLECULES

N. O. BRACE

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GQA 450 1 FIELD 7C, 7D, 7A,20L

UNIV OF CAL-RIVERSIDE, GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

ENERGY CONVERSION PROCESSES IN ORGANIC MOLECULAR CRYSTALS

D. R. KEARNS

DA-ARO-D-31-124-G511
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GQA 451 1 FIELD 7C, 7D,12A, 7B

SOUTHERN ILLINOIS UNIV, GRADUATE SCHOOL, CHEMISTRY, ILLINOIS

COPRECIPITATION STUDIES OF TRIVALENT RARE EARTH SYSTEMS

F. H. FIRSCHING

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/65- /

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GQA 452 2 FIELD 7C, 7D,20J

NEW YORK UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

STUDIES IN ORGANIC PHOTOCHEMISTRY

D. I. SCHUSTER

DA-ARO-D-31-124-G425
/65- /

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GQA 453 2 FIELD 7C, 7D,20M

A STUDY OF THE ELECTRONIC CONFIGURATION AND BEHAVIOR OF THE DIFLUOXAMINE GROUP

R. S. YORIS

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/65- /

DOD-ARMY

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GQA 454 2 FIELD 7C, 7D, 7B

STUDY OF RADICAL AND HIGH PRESSURE REACTIONS OF DIFLUORODIAZINE

A. ZLETZ

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GQA 459 2 FIELD 7C, 7D

YALE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, CONNECTICUT

A STUDY OF BICYCLIC SMALL RING COMPOUNDS

K. B. WIBERG

DA-31-124-ARO-D-32
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DOD-ARMY

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GQA 460 3 FIELD 7C, 7D,20J, 7B

MASS INST OF TECHNOL, GRADUATE SCHOOL, CHEMISTRY, MASSACHUSETTS

MOLECULAR STRUCTURES AND CHEMICAL BONDING IN INORGANIC COMPOUNDS

F. A. COTTON

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AVCO MFG CORP WILMIN, MASSACHUSETTS

STUDIES IN SHOCK TUBE CHEMICAL KINETICS AND THE EFFECT OF THE KINETICS CONTAMINANTS ON WAKE IONIZATION

J. ECKERMAN, A. MODICA

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UTAH ST UNIV OF AGRIC, GRADUATE SCHOOL, CHEMISTRY, UTAH

INFRARED SPECTRA OF HIGH-BOILING SUBSTANCES INERT MATRICES

R. L. REDINGTON

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GQF 7 9 FIELD 20J, 5A,20F

NEW YORK UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW YORK

ATOMIC HYDROGEN RECOMBINATION STUDIES

A. SALOP

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PI BONDED ORGANOSILICON COMPOUNDS

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HETEROGENEOUS CATALYSIS IN LIQUID SYSTEMS

R. L. BURWELL

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ISR INST OF TECHNOLOGY, ISRAEL

OPTICAL PROPERTIES OF ATOMIC DISPERSIONS IN INERT MATRICES

D. SCHNEPP

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STATISTICAL MECHANICAL THEORY OF TRANSPORT PROCESSES IN MIXTURES

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STABLE AND UNSTABLE SILYL AND GERMYL COMPOUNDS

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MECHANISM OF THE DIELS-ALDER REACTION

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REACTION MECHANISMS AND KINETICS IN SOLID PHASE REACTIONS IN

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THE PROPERTIES OF SOLUTIONS OF METALS DISSOLVED IN MOLTEN SALTS

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THERMODYNAMICS STABILITY SCALE OF STABLE ISOLABLE FREE RADICALS

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ELECTRONIC COMPUTER CALCULATIONS ON SIMPLE POLYATOMIC MOLECULES

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COORDINATION CHEMISTRY OF GROUP III ELEMENTS

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P. J. FLORY

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REACTIONS OF CHLOROCARBONIUM IONS

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PREPARATION AND PROPERTIES OF REACTIVE INTERMEDIATES

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MANCHESTER COLL OF SCI, ENG., UNITED KINGDOM

INHIBITION OF THE THERMAL REACTION BETWEEN HYDROGEN AND OXYGEN

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INFRARED SPECTRA OF COMPRESSED GASEOUS MIXTURES

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OXIDATION-REDUCTION REACTIONS OF ORGANIC SULFUR COMPOUNDS

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THE SOLVENT EXTRACTION BEHAVIOR OF INORGANIC COMPLEXES

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RING EXPANSION

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ROYAL INST OF TECHNOL, SWEDEN

SOLUTION CHEMISTRY

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REARRANGEMENTS OF CARBONIUM IONS AND FREE RADICALS IN THE BICYCLO /3.1.0/ HEXYL SYSTEM

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COORDINATION KINETICS OF MULTIDENTATE LIGANDS COMPLEXES

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GQF 3507 2 FIELD 7A, 7D,20M, 7B

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OXIDATION OF METALS BY PARTIALLY DISSOCIATED OXYGEN

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DETERMINATION OF MIXED VIRIAL COEFFICIENTS

J. BREWER

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THE AFOSR PROGRAM FOR SPACE CHEMISTRY AT UCLA

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MOLECULAR STRUCTURE OF CARBANIONS AND THE KINETICS OF THEIR EXCHANGE PROCESS IN SOLUTION

G. FRAENKEL

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CASE INST OF TECHNOL, GRADUATE SCHOOL, CHEMISTRY, OHIO

PHOTO-INDUCED REDOX REACTIONS

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INORGANIC STRUCTURE AND SPECTRA

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UNITED AIRCRAFT RES., CONNECTICUT

NON-EQUILIBRIUM IONIZATION

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VIRGINIA POLYTECH INST, GRADUATE SCHOOL, CHEMISTRY, VIRGINIA

OXIDATION OF ARSENIC /III/ AND ANTIMONY /III/

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RATES OF EXCHANGE OF SOLVENT MOLECULES WITH PARAMAGNETIC IONS

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LASER TEMPERATURE-JUMP STUDIES OF FAST REACTIONS

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DISPLACEMENT REACTIONS BY FREE RADICALS ON S-S AND O-O BONDS

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POLYNUCLEAR HYDROXO COMPLEXES

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GQF 3827 FIELD 5A,12A,20J

QUANTUM CHEMISTRY PROGRAM EXCHANGE

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BOSTON UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, MASSACHUSETTS

N2 A-TRIPLET-SIGMA STATE GENERATED BY 1849 ANGSTROM UNITS MERCURY PHOTOSENSITIZATION

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08 EARTH SCIENCES AND OCEANOGRAPHY

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UNIV OF CAL-LA JOLLA, GRADUATE SCHOOL, CHEMISTRY, CALIFORNIA

GEOCHEMISTRY OF TRACE ELEMENTS IN METEORITES

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J. R. ARNOLD, H. T. MILLARD

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GH 1095 1 FIELD 3A, 8F, 8G

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STUDY OF THE APPLICATION OF THE LAW OF SOLID CREEP TO CONVECTIVE MOTIONS IN THE EARTHS MANTLE, THE MOON AND PLANETS

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A STUDY OF THE GEOGRAPHICAL DISTRIBUTION OF GEOMAGNETIC MICROPULSATIONS

R. W. MCNICOL, J. S. MAINSTONE
H. C. WEBSTER

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GPF 382 3 FIELD 8D, 8G, 8C

MASS INST OF TECHNOL, GRADUATE SCHOOL, GEOLOGY + GEOPHYSICS, MASSACHUSETTS

VARIATIONS IN ISOTOPIC ABUNDANCES OF STRONTIUM, CALCIUM, AND ARGON AND RELATED TOPICS

P. M. HURLEY, H. W. FAIRBAIRN
W. H. PINSON

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GQA 303 1 FIELD 20+, 9+, 9A, 5A

GEOPHYSICS - MEGAGAUSS FIELDS

F. BITTER, F. *. BITTER, G. FIOCCO

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CRUSTAL STUDY IN NORWAY

J. HEALY

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DEFENSE-ADVANCED RES PROJECTS AGENCY

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CATALOGING AND INDEXING OF APPROXIMATELY ONE MILLION SPECIMENS OF SILURIAN-DEVONIAN BRACHIOPODS

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RAINFALL AND RUNOFF SEQUENCES IN ENGINEERING HYDROLOGY

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THE INFLUENCE OF THE WORK OF ABRAHAM GOTTLOB WERNER ON THE DEVELOPMENT OF THE SCIENCE OF GEOLOGY

A. M. OSPOVAT

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09 ELECTRONICS AND ELECTRICAL ENGINEERING

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RICE UNIVERSITY COMPUTER PROJECT

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S. RUSK, Z. SALSBURG, K. WATSON

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GQF 259123 FIELD 9+, 9A,12A, 9C

USDC, NATL BUR STAN, BOULDER, COLORADO

STUDY OF ANTENNA PATTERNS IN THE PRESENCE OF FINITE GROUND SURFACES

J. R. WAIT

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GQQ 8803 FIELD 9+, 9A,12A, 9D

UNIV OF CAL-BERKELEY, GRADUATE SCHOOL, MATHEMATICS, CALIFORNIA

REMOTE + STATION COMPUTER PROJECT

D. C. EVANS, M. D. HUSKEY

/65- /

DEFENSE-ADVANCED RES PROJECTS AGENCY

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GSE 890 FIELD 9+, 9A

NONLINEAR BEHAVIOR OF FIELD EFFECT TRANSISTORS

F. C. FITCHEN

NSF-GK-733
12/65-12/66

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GSE 893 FIELD 9+, 9A,12A

SYRACUSE UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, NEW YORK

A GENERAL PROGRAM FOR DETERMING WAVEGUIDE CHARACTERISTICS

R. F. HARRINGTON

NSF-GK-704
11/65-11/66

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GSE 895 FIELD 9+, 9A,12A

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, ILLINOIS

SPHERICAL AND RELATED NON-PLANAR ARRAYS

Y. T. LO

NSF-GK-714
12/65-12/66

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10 ENERGY CONVERSION (NON-PROPULSIVE)

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GQF 207570 FIELD 20D, 5A,10B

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

INTERNAL FLOW STUDIES PERTINENT TO ENERGY CONVERSION

M. KELLER

/65- /

DOD-AIR FORCE

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GQF 258795 2 FIELD 7C, 7D, 9+, 9C

STUDY OF THERMAL ENERGY CONVERSION AND STORAGE SYSTEMS

A. J. ROSENBERG

AF-19-628-02845
/65- /

DOD-AIR FORCE

11 MATERIALS

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GH 603 1 FIELD 11B,20L

RUTGERS THE STATE UNIV, SCHOOL OF ENGINEERING, CERAMIC ENGINEERING, NEW JERSEY

STUDIES OF MINIMUM-THICKNESS ELECTRO-CERAMIC FILMS, INCLUDING RELATIONSHIP OF MECHANICAL AND ELECTRONIC PROPERTIES TO METHOD OF FORM

D. A. LUPFER

NASA-NSG-447-F-4
6/64- 5/65

NASA

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GH 644 1 FIELD 11F,11G,20L

UNIVERSITY OF DENVER, SCHOOL OF ENGINEERING, METALLURGY, COLORADO

THE RELATIONSHIP BETWEEN THE THERMIONIC WORK FUNCTION OF REFRACTORY METAL INTERMETALLIC COMPOUNDS AND THEIR STRUCTURES

D. T. KLODT

NASA-NSG-765-F-4
6/64- 2/65

NASA

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GH 1602 FIELD 11G,11F

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, THEORETICAL + AP MECH, ILLINOIS

EFFECT OF REPEATED STRESS REVERALS ON CREEP DEFORMATION

J. MORROW, G. R. HALFORD
P. A. LILLIENTHAL

/65- /

NASA

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GPF 713 1 FIELD 11F,11G,20L

MICHIGAN TECHNOL UNIV, SCHOOL OF ENGINEERING, METALLURGICAL ENGIN, MICHIGAN

EFFECT OF ANNEALING ON THE SUBSTRUCTURE OF COLD WORKED FCC METALS AND ALLOYS

D. F. MIKKOLA

AT(11-1)1431
1/66-12/66

AEC-DIVISION OF PHYSICAL RES

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GPF 778 4 FIELD 20M,11F,11G,20F

CASE INST OF TECHNOL, SCHOOL OF ENGINEERING, METALLURGY, OHIO

KINETICS OF PHASE TRANSFORMATIONS IN ZIRCONIUM-NIOBIUM ALLOYS

R. F. HEHEMANN, D. F. GIBBONS
P. E. YAFFE

AT(11-1)-388
11/65-10/66

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GQA 358 1 FIELD 11M,13M,11G

SURFACE ENERGY EFFECTS IN SLIDING PHENOMENA

E. RABINOWICZ

DA-31-124-ARO-D-143
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DOD-ARMY

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GQA 444 1 FIELD 11F,11G

LEHIGH UNIVERSITY, SCHOOL OF ENGINEERING, METALLURGICAL ENGIN, PENNSYLVANIA

FINE STRUCTURE PRODUCED BY CYCLIC MARTENSITIC TRANSFORMATION

G. KRAUSS

DA-31-124-ARO-D-237
/65- /

DOD-ARMY

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GQF 1139 5 FIELD 11G,11D

MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, METALLURGY, MASSACHUSETTS

MECHANICAL BEHAVIOR OF METAL COMPOSITES

J. WULFF

AF-49-638-01463
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GQF 2371 4 FIELD 11F,11G, 5A

UNIV OF NORTH DAKOTA, GRADUATE SCHOOL, PHYSICS, NORTH DAKOTA

RESIDUAL STRESSES IN SILVER RESULTING FROM STRAIN DISTORTION AROUND IMPURITIES

E. A. WHALIN

AF-AFOSR-0189-63
/65- /

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GQF 2419 4 FIELD 11F,13M,11G

UNIV OF WISCONSIN, SCHOOL OF ENGINEERING, MINERALS + METALS ENG, WISCONSIN

MECHANISM OF STRESS CORROSION CRACKING IN FACE-CENTERED CUBIC METALS

R. A. DODD

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GQF 2779 3 FIELD 5A,20F,20D,20L

CORNELL UNIVERSITY, SCHOOL OF ENGINEERING, ENGIN PHYS + MAT SCI, NEW YORK

OXIDATION OF METAL SURFACES STUDIED BY ELECTRON DIFFRACTION AND MICROSCOPY

B. M. SIEGEL

AF-AFOSR-0778-65
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GQF 3508 2 FIELD 11F,11G

RECRYSTALLIZATION AND GRAIN GROWTH IN MAGNESIUM AND CHROMIUM AND NICKEL

C. H. PITT

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GQF 3538 1 FIELD 11G

NORTHWESTERN UNIV, SCHOOL OF ENGINEERING, MATERIALS SCIENCE, ILLINOIS

PHASE TRANSFORMATION AND PRECIPITATION STUDIES IN CERAMICS

M. E. FINE, M. *. FINE

AF-AFOSR-0327-63
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GQF 4312 FIELD 20H, 5A,20L, 7B

CARNEGIE INST TECHNOL, SCHOOL OF ENGINEERING, PHYSICS, PENNSYLVANIA

ELECTRONIC SPECIFIC HEAT OF NOBLE AND TRANSITION METAL ALLOYS

J. A. RAYNE

AF-AFOSR-0870-65
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GQF 4317 FIELD 11G

UNIV OF NOTRE DAME, SCHOOL OF ENGINEERING, METAL ENGIN * MAT SCI, INDIANA

STRAIN ENERGY AND METASTABILITY OF THREE DIMENSIONAL DISLOCATIONS, ARRAYS

C. W. ALLEN

AF-AFOSR-0809-65
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GQF 4349 FIELD 11F,11G

CASE INST OF TECHNOL, SCHOOL OF ENGINEERING, METALLURGY, OHIO

MECHANICAL PROPERTIES OF BODY-CENTERED CUBIC REFRACTORY METALS

T. E. MITCHELL

AF-AFOSR-0829-65
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GQF 70 10 FIELD 12A,13M,20C

PARTIAL DIFFERENTIAL EQUATIONS

J. J. GERGEN

AF-AFOSR-0435-63
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GQF 72 8 FIELD 12A

ALGEBRAIC LINEAR SYSTEMS

O. ZARISKI

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/65- /

DOD-AIR FORCE

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GQF 81 8 FIELD 3C, 3A,12A

MASS INST OF TECHNOL, GRADUATE SCHOOL, MATHEMATICS, MASSACHUSETTS

ALGEBRA ABSTRACT VARIETIES AND POTENTIAL THEORY

W. T. MARTIN

AF-AFOSR-0335-63
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GQF 320 7 FIELD 12A,13M,20D

UNIVERSITY OF MARYLAND, GRADUATE SCHOOL, MATHEMATICS, MARYLAND

MATHEMATICAL RESEARCH IN FLUID DYNAMICS AND APPLIED MATHEMATICS

J. B. DIAZ

AF-AFOSR-0400-64
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DOD-AIR FORCE

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GQA 457 1 FIELD 12A

STANFORD UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, CALIFORNIA

ANALYTIC DIFFERENTIABLE AND PSEUDOGROUP STRUCTURES

D. C. SPENCER

DA-31-124-ARO-D-151
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DOD-ARMY

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GQA 469 FIELD 12A, 5C

THE COMBINED USE OF MONTE CARLO PROCEDURES AND ANALYTIC APPROSIMATIONS IN STATISTICAL DISTRIBUTION PROBLEMS

H. O. HARTLEY

DA-31-124-ARO-D-282
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DOD-ARMY

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GQF 1170 5 FIELD 12A,20J

CAMBRIDGE LANG RES, UNITED KINGDOM

A SEQUENTIAL LOGIC FOR INFORMATION STRUCTURE

E. W. BASTIN

AF-EOAR-0078-65
/65- /

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GQF 3759 1 FIELD 22C,12A,20H,20J

NORTHWESTERN UNIV, GRADUATE SCHOOL, MATHEMATICS, ILLINOIS

DIFFERENTIAL GEOMETRY AND MATHEMATICAL PHYSICS

R. HERMAN

AF-AFOSR-0512-64
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GQF 3781 1 FIELD 12A

UNIV OF CAL-BERKELEY, GRADUATE SCHOOL, MATHEMATICS, CALIFORNIA

PARTIAL DIFFERENTIAL EQUATIONS OPERATOR THEORY AND APPLICATIONS

M. H. PROTTER

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GQF 3823 FIELD 9+,12A, 9D, 5C

UNIVERSITY OF MICHIGAN, GRADUATE SCHOOL, MATHEMATICS, MICHIGAN

APPLICATIONS OF GRAPH THEORY

F. HARARY

AF-AFOSR-0754-65
/65- /

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GQF 3978 FIELD 12A, 9D

UNIV OF NORTH CAROLINA, GRADUATE SCHOOL, STATISTICS, NORTH CAROLINA

MATHEMATICAL STATISTICS

G. E. NICHOLSON, G. *. NICHOLSON

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GQF 4430 FIELD 12A

UNIV OF MINNESOTA, GRADUATE SCHOOL, MATHEMATICS, MINNESOTA

PARTIAL DIFFERENTIAL EQUATIONS AND CALCULUS OF VARIATIONS

J. SERRIN

AF-AFOSR-0883-65
/65- /

DOD-AIR FORCE

13 MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

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GQA 13 FIELD 12A,13M,10B

IIT RESEARCH INSTITUTE, AT ILL INST OF TECHNOL, ILLINOIS

LABORATORY STUDIES OF SHELTER ENVIRONMENT-SCALED MODELS

W. J. CHRISTIAN, A. GOLDSMITH

8-64210-4949A-18-US
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GQA 21 2 FIELD 13B,12A,13M,20D

FRANKLIN INSTITUTE, PENNSYLVANIA

HEAT TRANSFER IN COARSE FILTER BEDS

G. P. WACHTELL

OCD-OS-63-131
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GQA 334 2 FIELD 20D,10B

FRANKLIN INSTITUTE, PENNSYLVANIA

A STABILITY ANALYSIS OF TILTING PAD BEARINGS

D. D. FULLER

DA-31-124-ARO-D-147
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GQF 349 8 FIELD 13M,12A, 9A

AMER. SOC. OF MECH., NEW YORK

APPLIED MECHANICS REVIEWS

B. JUHASZ

AF-49-638-01549
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GQF 4502 FIELD 9A

FIFTH U.S. NATIONAL CONGRESS OF APPLIED MECHANICS

E. SILBERMAN

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14 METHODS AND EQUIPMENT

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GM 529 2 FIELD 14B

UNIVERSITY OF ARIZONA, GRADUATE SCHOOL, ASTRONOMY, ARIZONA

CONDUCT A RESEARCH TO DEVELOP AND TEST A PROTOTYPE PHOTO-POLARIMETER SUITABLE FOR USE WITH BALLOONS AND SPACE VEHICLES

A. M. GEHRELS

NASR-138
11/64-10/65

NASA

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GM 1256 1 FIELD 9+, 9A,20J, 5A

OHIO STATE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, OHIO

THEORETICAL AND EXPERIMENTAL INVESTIGATION OF THE MEASUREMENT OF ANGULAR ROTATION

C. V. HEER

NASA-E-6-NSG-552
10/64- 9/65

NASA

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GQF 2681 4 FIELD 20D

UNIVERSITY OF VIRGINIA, SCHOOL OF ENGINEERING, AEROSPACE ENGINEERING, VIRGINIA

ELECTROMAGNETIC SUSPENSION SYSTEM FOR MEASUREMENT OF AERODYNAMIC CHARACTERISTICS

H. M. PARKER

AF-AFOSR-0092-62
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15 MILITARY SCIENCES

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GQA 161 FIELD 12A,15C,19+,19H

STANFORD RESEARCH INST, MENLO PARK, CALIFORNIA

EVALUATION OF NUCLEAR WEAPON THERMAL THREAT

F. I. JOHN

OCD-PS-64-201
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GQA 174 FIELD 15G

THE OPTIMUM MAINTENANCE SERVICE SUPPORT TOMSS

J. KEMPER, W. BASS

DA-19-020-AMC-00440
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DOD-ARMY

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GQA 183 FIELD 12A, 5C,15C,15G

AMMUNITION SERVICE TO THE FIELD 1965-1970 SUBSTUDY ON THROUGHPUT

J. KEMPER, F. DAVID

DA-19-020-AMC-00440
/65- /

DOD-ARMY

17 NAVIGATION, COMMUNICATIONS DETECTION AND COUNTERMEASURES

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GQF 3834 FIELD 9+,12A

UNIV OF CAL-L. A., SCHOOL OF ENGINEERING, ENGINEERING, CALIFORNIA

COMMUNICATION SYSTEMS THEORY

A. V. BALAKRISHNAN

AF-AFOSR-0700-65
/65- /

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GQF 4435 FIELD 9+,12A, 9D, 9C

UNIV OF SOUTHERN CALIF, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

AUTOMATA AND COMMUNICATIONS

S. W. GOLOMB

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GQF 4438 FIELD 9+

STANFORD UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

COMMUNICATION VIA TIME-VARIANT CHANNELS

T. KAILATH

AF-49-638-01517
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GQF 259051 FIELD 4A, 9C, 9+, 9A

STANFORD RESEARCH INST, MENLO PARK, CALIFORNIA

RESEARCH STUDY OF RADIATION + RECEPTION OF EM ENERGY FROM AIRCRAFT + GUIDED MISSILES

T. MORITA

AF-19-628-04800
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18 NUCLEAR SCIENCE AND TECHNOLOGY

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GH 1379 1 FIELD 18A

US, AEC, ORNL, ONAL LAB, TENNESSEE

CONDUCT INVESTIGATIONS IN HIGH ENERGY RADIATION DOSIMETRY

A. HOLLAENDER

R-104-X031
1/65-12/65

NASA

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GPE 316 3 FIELD 7D, 7C, 7A,18A

TRACER LAB., INC., MASSACHUSETTS

PHYSICAL, CHEMICAL AND RADIOCHEMICAL ANALYSIS OF FILTER DEBRIS

L. LEVANTHAL

AT-04-3-453
11/64-12/65

AEC-BIOLOGY + MEDICINE

19 ORDNANCE

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GQA 176 FIELD 11F,13H,11G,15C

GENERAL MOTORS CORP, SANTA BARBARA, CALIFORNIA

PENETRATION MECHANISMS OF HIGH VELOCITY PROJECTILES

J. W. GEHRING

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DOD-ARMY

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GQF 3484 2 FIELD 19D,21D,21I, 7A

FORMATION OF DETONATION WAVES IN FLOWING GASEOUS MIXTURES

L. E. ROLLINGER

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GQF 207055 3 FIELD 7C,19D,21B,21I

UNIV OF TORONTO, SCHOOL OF ENGINEERING, AEROPHYSICS, CANADA

RESEARCH SURVEY AND STUDIES OF ADVANCED HYPERVELOCITY LAUNCHING TECHNIQUES

I. I. GLASS

AF-33-615-02766
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PHYSICS

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GSE 924 FIELD 20D

COLORADO STATE UNIV, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, COLORADO

UNSTEADY BOUNDARY LAYER SEPARATION

V. A. SANDBORN

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12/65-12/66

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GSE 927 FIELD 20L,20K

WEST VIRGINIA UNIV, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, WEST VIRGINIA

REINFORCED AND PRESTRESSED CONCRETE MEMBERS SUBJECTED TO TORSION

E. L. KEMP

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12/65-12/66

NSF-ENGINEERING SCIENCES DIVISION

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GSE 940 FIELD 12A,13M,20L,20D

TRANSIENT WAVES IN LINEAR VISCOELASTIC MEDIA

K. C. VALANIS

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12/65-12/66

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GSP 875 2 FIELD 18A

NORTHWESTERN UNIV, GRADUATE SCHOOL, PHYSICS, ILLINOIS

INVESTIGATION OF HYPERFRAGMENTS

J. H. ROBERTS, R. G. AMMAR

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GSP 875 3 FIELD 18A

NORTHWESTERN UNIV, GRADUATE SCHOOL, PHYSICS, ILLINOIS

INVESTIGATION OF HYPERFRAGMENTS

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GSP 928 2 FIELD 20M,18A,20L

UNIV OF KENTUCKY, GRADUATE SCHOOL, PHYSICS, KENTUCKY

ELEMENTARY PARTICLE RESONANCE STUDIES

V. P. KENNEY, J. G. MOHAT, W. D. SHEPHARD C. W. VITTITOE

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GSP 928 3 FIELD 20M,18A,20L

UNIV OF KENTUCKY, GRADUATE SCHOOL, PHYSICS, KENTUCKY

ELEMENTARY PARTICLE RESONANCE STUDIES

V. P. KENNEY, J. G. MOHAT, W. D. SHEPHARD C. W. VITTITOE

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GSP 967 3 FIELD 7C,20J,20H, 7B

WAYNE STATE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, MICHIGAN

QUANTUM MECHANICAL STUDIES OF MOLECULAR PROPERTIES

D. O. EBBING

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3/66- 3/67

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GSP 1515 1 FIELD 20J,20C, 5A,20L

UNIV OF PITTSBURGH, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

NUCLEAR MAGNETIC RESONANCE

W. I. GOLDBURG

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4/65- 4/66

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GSP 1678 1 FIELD 3A, 3B,14B,20D

OHIO STATE UNIVERSITY, GRADUATE SCHOOL, ASTRONOMY, OHIO

SPECTROSCOPY OF HIGH-TEMPERATURE GASES WITH LUMINOUS SHOCK TUBE

A. SLEFTEDAK

NSF-GP-3134
7/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2073 FIELD 20D, 5A, 7B

UNIV OF PENNSYLVANIA, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

LIQUID HELIUM

K. R. ATKINS

NSF-GP-3708
11/64-11/65

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GSP 2073 1 FIELD 20D, 5A, 7B

UNIV OF PENNSYLVANIA, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

LIQUID HELIUM

K. R. ATKINS

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11/65-11/66

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GSP 2259 FIELD 20F,20L

UNIVERSITY OF MICHIGAN, GRADUATE SCHOOL, CHEMISTRY, MICHIGAN

ELECTRICAL-CONDUCTING ATTENUATED, TOTAL-REFLECTANCE CRYSTALS

H. B. MARK

NSF-GP-4620
5/65- 5/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2270 FIELD 12A,20J

INDIANA UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, INDIANA

DISCONTINUITIES IN THE SPACE-TIME CONTINUUM

T. Y. THOMAS

NSF-GP-4236
7/65- 7/66

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GSP 2390 1 FIELD 5A,20L

NEW YORK UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW YORK

ELECTRONIC CONDUCTIVITY IN ORGANIC SOLIDS

M. POPE, H. P. KALLMAN

NSF-GP-4206
3/66- 3/67

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2392 FIELD 20J, 5A,20L

YALE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, CONNECTICUT

FAR INFRARED SPECTROSCOPY OF SPIN WAVES

R. G. WHEELER

NSF-GP-4202
4/65- 4/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2394 FIELD 11F,11G, 5A

TULANE UNIV OF LA, GRADUATE SCHOOL, PHYSICS, LOUISIANA

DISLOCATIONS IN LAMELLAR CRYSTALS OF COLLOIDAL GOLD

R. H. MORRISS

NSF-GP-4230
4/65- 4/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2395 FIELD 9*, 9A, 5A,20F

COLUMBIA UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW YORK

INTERACTION OF MICROWAVES WITH ELECTRON TUNNELING IN SUPERCONDUCTORS

H. A. MUSSE

NSF-GP-4324
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2399 FIELD 9*,20F

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, MICHIGAN

ACOUSTIC AND ELECTROMAGNETIC SCATTERING PROBLEMS FOR LOW FREQUENCIES

T. B. SENIOR, R. E. KLEINMAN, C. TAI

NSF-GP-4561
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2419 FIELD 12A,20H,20J

RENSSELAER POLYTC INST, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

MECHANICS OF CONTINUOUS BODIES

G. M. MANDELMAN, C. BLOOM, D. COHEN G. HABETLER, P. MCGLOIN, P. SLEPIAN

NSF-GP-4177
7/65- 7/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2420 FIELD 5A

CONCORDIA COLLEGE, UNDERGRADUATE SCHOOL, PHYSICS, MINNESOTA

AUTOIONIZATION OF GASES BY ION IMPACT

M. E. RUDD, C. A. SAUTTER

NSF-GP-4207
3/65- 3/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2421 FIELD 5A,20L

CORNELL UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW YORK

INTERNATIONAL CONFERENCE ON THE PHYSICS OF X-RAY SPECTRA

L. G. PARRATT, J. A. BEARDEN E. L. JOSSEM

NSF-GP-4136
2/65- 2/66

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GSP 2422 FIELD 5A,20L

CORNELL UNIVERSITY, SCHOOL OF ENGINEERING, ENGIN PHYS + MAT SCI, NEW YORK

CRITICAL PHENOMENA, DEFECTS AND IDEAL CRYSTALS

M. W. WEBB

NSF-GP-4235
6/65- 6/66

NSF-PHYSICAL SCIENCES DIVISION

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GSP 2424 FIELD 5A, 7D

GORDON RES CONF KING, RHODE ISLAND

GORDON RESEARCH CONFERENCE ON PHOTONUCLEAR REACTIONS

W. G. PARKS, G. R. BISHOP, W. *. PARKS W. D. WHITEHEAD

NSF-GP-4122
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GSP 2427 FIELD 5A,20L

UNIVERSITY OF UTAH, GRADUATE SCHOOL, PHYSICS, UTAH

NMR STUDIES OF ULTRASLOW ATOMIC AND MOLECULAR MOTIONS

D. C. AILION

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4/65- 4/66

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GSP 2429 FIELD 5A,20L

UNIVERSITY OF ILLINOIS, GRADUATE SCHOOL, PHYSICS, ILLINOIS

PROPERTIES OF SUPERCONDUCTORS

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GSP 2430 FIELD 20J, 5A

PRINCETON UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW JERSEY

HIGH RESOLUTION MASS SPECTROSCOPY

W. BLEAKNEY, L. SMITH

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GSP 2431 FIELD 5A,20L

UNIV OF PENNSYLVANIA, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

NUCLEAR RESONANCE IN SOLIDS

A. J. HEEGER

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GSP 2431 1 FIELD 5A,20L

UNIV OF PENNSYLVANIA, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

NUCLEAR RESONANCE IN SOLIDS

A. J. HEEGER

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3/66- 3/67

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GSP 2432 FIELD 20D, 5A

UNIVERSITY OF OKLAHOMA, GRADUATE SCHOOL, PHYSICS, OKLAHOMA

STATIONARITY IN VISCOUS FLOW, SIMULTANEOUS ROTATION AND TRANSLATION

S. BROERSMA

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6/65- 6/66

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GSP 2435 FIELD 5A,20L

PURDUE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, INDIANA

MOLECULAR LIBRATIONS IN CRYSTALS

H. M. JAMES

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3/65- 3/66

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GSP 2435 1 FIELD 5A,20L

PURDUE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, INDIANA

MOLECULAR LIBRATIONS IN CRYSTALS

H. M. JAMES

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GSP 2437 FIELD 5A,20L,20J

CARNEGIE INST TECHNOL, SCHOOL OF ENGINEERING, PHYSICS, PENNSYLVANIA

STATISTICAL MECHANICS AND SOLID-STATE THEORY

J. S. LANGER, R. B. GRIFFITHS
C. MAJUMDAR, E. J. WOLL

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GSP 2437 1 FIELD 5A,20L,20J

CARNEGIE INST TECHNOL, SCHOOL OF ENGINEERING, PHYSICS, PENNSYLVANIA

STATISTICAL MECHANICS AND SOLID-STATE THEORY

J. S. LANGER, R. B. GRIFFITHS
C. MAJUMDAR, E. J. WOLL

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GSP 2438 FIELD 5A,20L

TUFTS UNIVERSITY, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

IMPERFECTIONS IN CRYSTALLINE SOLIDS

K. A. MCCARTHY, L. GUNTHER, R. H. WEBB

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GSP 2439 FIELD 20J, 5A

UNIV OF TENNESSEE, GRADUATE SCHOOL, PHYSICS, TENNESSEE

ATOMIC AND MOLECULAR INTERACTIONS

R. D. PRESENT, H. W. GRABEN

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GSP 2440 FIELD 5A,18A,20H

LOUISIANA ST UNIV A+M, GRADUATE SCHOOL, PHYSICS + ASTRONOMY, LOUISIANA

ULTRA-HIGH ENERGY ELEMENTARY PARTICLE PHENOMENA

R. W. HUGGETT, I. DAISUKE, N. M. NIKOLIC
K. PINKAU

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3/65- 3/66

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GSP 2440 1 FIELD 5A,18A,20H

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ULTRA-HIGH ENERGY ELEMENTARY PARTICLE PHENOMENA

R. W. HUGGETT, I. DAISUKE, N. M. NIKOLIC
K. PINKAU

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GSP 2441 FIELD 5A,20L

STATE UNIV N Y BUFFALO, GRADUATE SCHOOL, PHYSICS, NEW YORK

MAGNETIC PROPERTIES OF SUPERCONDUCTORS

R. I. GAYLEY

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GSP 2442 FIELD 20M, 5A,20J

STANFORD UNIVERSITY, GRADUATE SCHOOL, PHYSICS, CALIFORNIA

MACROSCOPIC QUANTUM EFFECTS

W. M. FAIRBANK, M. EDWARDS

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GSP 2442 1 FIELD 20M, 5A,20J

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MACROSCOPIC QUANTUM EFFECTS

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GSP 2443 FIELD 20M, 5A,20L

RICE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, TEXAS

LOW TEMPERATURE AND SOLID STATE PHYSICS

M. E. RORSCHACH

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GSP 2445 FIELD 5A,20L

UNIVERSITY OF OREGON, GRADUATE SCHOOL, PHYSICS, OREGON

THEORY OF METALS

J. W. MCCLURE

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7/65- 7/66

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GSP 2446 FIELD 5A,20J

LEHIGH UNIVERSITY, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

STATISTICAL MECHANICS AND TRANSPORT PROBLEMS

J. A. MCLENNAN, S. H. RADIN

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GSP 2449 FIELD 5A, 7D

GEORGIA INST OF TECH, GRADUATE SCHOOL, PHYSICS, GEORGIA

STUDIES OF NUCLEAR STRUCTURE

L. D. WYLY, C. H. BRADEN

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GSP 2450 FIELD 5A, 7D

UNIVERSITY OF FLORIDA, GRADUATE SCHOOL, PHYSICS, FLORIDA

POLARIZATION OF THE NEUTRONS IN STRIPPING REACTIONS

A. R. QUINTON

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GSP 2451 FIELD 5A, 7D

BOSTON UNIVERSITY, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

NUCLEAR RESONANCE SCATTERING OF BREMSSTRAHLUNG

F. C. BOUTH, W. J. ALSTON

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GSP 2454 FIELD 5A

UNIV OF MINNESOTA, GRADUATE SCHOOL, PHYSICS, MINNESOTA

ION COLLISIONS AT LOW ENERGIES

C. F. GIESE

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7/65- 7/66

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GSP 2462 FIELD 20D, 5A,20F

UNIVERSITY OF ARKANSAS, GRADUATE SCHOOL, PHYSICS, ARKANSAS

X-RAY DIFFRACTION STUDIES OF LIQUIDS

G. T. CLAYTON

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GSP 2463 FIELD 5A

ULTRASONIC WAVES IN ANISTROPIC MEDIA

R. A. ARTMAN

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6/65- 6/66

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GSP 2464 FIELD 5A,20H

ELEMENTARY PARTICLE THEORY

G. E. SCHRANK, J. R. FULCO, W. C. RAMSAY

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4/65- 4/66

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GSP 2466 FIELD 5A,20F,20L

MICHIGAN STATE UNIV, GRADUATE SCHOOL, PHYSICS + ASTRONOMY, MICHIGAN

DIFFRACTION OF LIGHT BY ULTRASONIC WAVES IN TRANSPARENT SOLIDS

E. A. NIEDEMANN, B. D. COOK

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GSP 2466 1 FIELD 5A,20F,20L

MICHIGAN STATE UNIV, GRADUATE SCHOOL, PHYSICS + ASTRONOMY, MICHIGAN

DIFFRACTION OF LIGHT BY ULTRASONIC WAVES IN TRANSPARENT SOLIDS

E. A. NIEDEMANN, B. D. COOK

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GSP 2468 FIELD 5A,18A,20H,20J

TEMPLE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

RELATIVISTIC THEORY OF INTERACTING PARTICLES

P. HAVAS

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6/65- 6/66

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GSP 2469 FIELD 5A,20L

UNIVERSITY OF GEORGIA, GRADUATE SCHOOL, PHYSICS, GEORGIA

THEORETICAL SOLID STATE PROPERTIES

J. M. HENKEL

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6/65- 6/66

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GSP 2471 FIELD 5A,20F

OPTICAL PUMPING EXPERIMENTS

F. M. PIPKIN

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GSP 2474 FIELD 5A,20L

WABASH COLLEGE, UNDERGRADUATE SCHOOL, PHYSICS, INDIANA

ANHARMONICITY OF LATTICE VIBRATION IN CRYSTALS

R. L. HENRY, V. J. EASTERLING
L. S. SALTER

NSF-GP-4365
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GSP 2475 FIELD 5A,20L

WICHITA STATE UNIV, GRADUATE SCHOOL, PHYSICS, KANSAS

ADHESION OF SOLIDS

J. B. BREAZEALE

NSF-GP-4462
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GSP 2476 FIELD 5A,20L,20J

UNIV OF PENNSYLVANIA, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

MANY-BODY PROBLEMS IN SOLIDS

D. J. SCALAPINO, J. R. SCHRIEFFER

NSF-GP-4332
7/65- 7/66

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GSP 2477 FIELD 5A, 7D

NUCLEON-NUCLEON BREMSSTRAHLUNG

M. I. SOBEL

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GSP 2479 FIELD 5A,20H

UNIVERSITY OF CHICAGO, GRADUATE SCHOOL, PHYSICS, ILLINOIS

ELEMENTARY PARTICLE PHYSICS

R. H. HILDEBRAND

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GSP 2480 FIELD 5A, 7D, 7B

UNIV OF SOUTH CAROLINA, GRADUATE SCHOOL, PHYSICS, SOUTH CAROLINA

NUCLEAR REACTIONS INDUCED BY HELIUM-3

R. D. EDGE

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GSP 2481 FIELD 5A,20H

UNIVERSITY OF ILLINOIS, GRADUATE SCHOOL, PHYSICS, ILLINOIS

THEORY OF HYPERON INTERACTIONS

J. N. PAPPADEMOS

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GSP 2482 FIELD 5A, 7D

UNIV OF KENTUCKY, GRADUATE SCHOOL, PHYSICS, KENTUCKY

NUCLEAR STRUCTURE AND NUCLEAR REACTIONS

B. D. KERN, M. T. MCELLISTREM

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GSP 2483 FIELD 5A, 7D, 7B

A THEORETICAL STUDY OF THE EVAN-PARITY EXCITED STATES OF O16

P. JOLLY

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9/65- 9/66

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GSP 2484 FIELD 5A,20H, 7D

WESTERN RESERVE UNIV, GRADUATE SCHOOL, PHYSICS, OHIO

NUCLEAR AND HYPERNUCLEAR STRUCTURE

L. S. KISSLINGER

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GSP 2486 FIELD 5A,18A,20H

BUBBLE CHAMBER STUDIES OF ELEMENTARY PARTICLES

H. J. MARTIN

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GSP 2488 FIELD 5A, 7D

STATE UNIV N Y STONY, GRADUATE SCHOOL, PHYSICS, NEW YORK

NUCLEAR STRUCTURE

A. M. FEINGOLD, B. J. RAZ

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GSP 2489 FIELD 5A,20L

RUTGERS THE STATE UNIV, GRADUATE SCHOOL, PHYSICS, NEW JERSEY

THEORETICAL SOLID STATE PHYSICS

E. ABRAHAMS, P. R. WEISS

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GSP 2490 FIELD 5A,20J

OHIO STATE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, OHIO

QUANTUM FIELD THEORY

R. L. MILLS

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GSP 2493 FIELD 5A,20L, 7B

MOSSBAUER STUDIES OF IRON-GERMANIUM ALLOYS

L. V. CHERRY

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GSP 2494 FIELD 5A,20L

BROWN UNIVERSITY, GRADUATE SCHOOL, PHYSICS, RHODE ISLAND

BAND STRUCTURE CALCULATIONS USING THE K.P METHOD

M. CARDONA, F. H. POLLAK

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GSP 2495 FIELD 5A,20L

MONTANA STATE COLLEGE, GRADUATE SCHOOL, PHYSICS, MONTANA

FORBIDDEN HYPERFINE TRANSITIONS IN EPR SPECTRA

J. E. DRUMHELLER

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GSP 2497 FIELD 5A,20J

STATE UNIV N Y STONY, GRADUATE SCHOOL, PHYSICS, NEW YORK

STATISTICAL THEORY OF COMPLEX SPECTRA

D. FOX, P. B. KAHN

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GSP 2498 FIELD 20M, 5A

MASS INST OF TECHNOL, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

GENERALIZED THERMODYNAMICS

L. TISZA

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GSP 2499 FIELD 5A, 7D

LEHIGH UNIVERSITY, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

THEORETICAL NUCLEAR PHYSICS

R. T. FOLK

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GSP 2502 FIELD 5A,20H

GEORGIA INST OF TECH, GRADUATE SCHOOL, PHYSICS, GEORGIA

COO RULES FOR STRONG INTERACTIONS

I. R. GATLAND

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GSP 2504 FIELD 5A,20M,20J

RUTGERS THE STATE UNIV, GRADUATE SCHOOL, PHYSICS, NEW JERSEY

QUANTUM FIELD THEORY

J. G. TAYLOR

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6/65- 6/66

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GSP 2505 FIELD 5A, 7D

CORNELL UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW YORK

FUNDAMENTAL NUCLEAR PHYSICS AND ASTROPHYSICS

H. A. BETHE

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GSP 2507 FIELD 5A,20L

WAYNE STATE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, MICHIGAN

POSITRON ANNIHILATION CONFERENCE

L. O. ROELLIG

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GSP 2508 FIELD 5A,20H

UNIVERSITY OF COLORADO, GRADUATE SCHOOL, PHYSICS + ASTROPHYSICS, COLORADO

HYPERNUCLEAR INTERACTIONS

B. W. DOWNS

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4/65- 4/66

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GSP 2509 FIELD 5A,20J

UNIVERSITY OF DELAWARE, GRADUATE SCHOOL, PHYSICS, DELAWARE

RELATIVISTIC MANY-PARTICLE THEORY

E. H. KERNER

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6/65- 6/66

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GSP 2510 FIELD 5A,20H,20J

NEW YORK UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW YORK

QUANTUM FIELD THEORY AND ELEMENTARY PARTICLE PHYSICS

W. ZIMMERMANN, J. BERNSTEIN, K. SYMANZIK

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GSP 2511 FIELD 5A,20J

STEVENS INST OF TECH, GRADUATE SCHOOL, PHYSICS, NEW JERSEY

SUPPLEMENTARY CONDITIONS IN THE QUANTIZATION OF FIELD THEORIES

J. L. ANDERSON

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GSP 2512 FIELD 5A,20L,20J

UNIVERSITY OF OREGON, GRADUATE SCHOOL, PHYSICS, OREGON

THEORY OF MANY-PARTICLE SYSTEMS

M. D. GIRARDEAU

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GSP 2513 FIELD 5A, 7D

VANDERBILT UNIVERSITY, GRADUATE SCHOOL, PHYSICS + ASTRONOMY, TENNESSEE

NUCLEAR STRUCTURE THEORY

W. T. PINKSTON

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OREGON STATE UNIV, GRADUATE SCHOOL, GENERAL SCIENCE, OREGON

THE ZEEMAN EFFECT AND THE BOHR THEORY OF THE ATOM - 1913-1925

J. B. SPENCER

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7/65- 7/66

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SJW 408 FIELD 13G,20D

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

MICROSCOPIC DETERMINATION OF TRACTIVE FORCE DISTRIBUTION IN FREE-SURFACE WATER CONVEYANCES

H. G. WENZEL, V. T. CHOW

INT-W4-A-006-ILL
/66- /

INTERIOR-OFFICE OF WATER RESOURCES

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JAG 3 FIELD 12A,13M,20L

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, AERONAUT + ASTRONAUT, ILLINOIS

APPROXIMATE SOLUTIONS IN LINEAR VISCOELASTICITY

H. H. HILTON, J. R. CLEMENTS

/65- /

AEROJET-GENERAL CORPORATION

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NG 21 FIELD 20M,20J, 5A, 7B

PURDUE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, INDIANA

FINE STRUCTURE OF THE HE II 4686 A LINE IN AN ATOMIC BEAM SOURCE

R. W. STANLEY, H. P. LARSON

6/64- 5/65

PURDUE UNIVERSITY

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NG 42 FIELD 20C,20F

PURDUE UNIVERSITY, SCHOOL OF ENGINEERING, AERONAUT + ENGIN SCI, INDIANA

EXPERIMENTAL VERIFICATION OF A COUPLING EFFECT

A. C. ERINGEN, R. J. BEIL

6/64- 5/65

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NG 107 FIELD 5A,20L, 7B

PURDUE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, INDIANA

ELECTRON TRANSPORT PROPERTIES OF CADMIUM

A. N. GERRITSEN, O. P. KATYAL

4/65- 3/66

PURDUE UNIVERSITY

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NGI 26 FIELD 20L,20D,20K

GEORGIA INST OF TECH, SCHOOL OF ENGINEERING, ENGINEERING MECHANICS, GEORGIA

ON THE OSCILLATIONS OF THIN ELASTIC SHELLS COUPLED WITH A FLUID

G. M. RENTZEPIS

1/66- 1/67

GEORGIA INSTITUTE OF TECHNOLOGY

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NGI 37 FIELD 20L,20K

GEORGIA INST OF TECH, SCHOOL OF ENGINEERING, ENGINEERING MECHANICS, GEORGIA

BUCKLING OF SPHERICAL SANDWICH SHELLS

J. P. ANDERSON, M. E. RAVILLE

1/66- 1/67

GEORGIA INSTITUTE OF TECHNOLOGY

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NIL 73 FIELD 11B,20F,20L, 7B

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CERAMIC ENGINEERING, ILLINOIS

SEMICONDUCTIVITY IN GLASS SYSTEMS V2O3-P2O5 AND V2O5-P2O5

P. J. ROEGER, A. L. FRIEDBERG

/65- /

ILLINOIS, UNIVERSITY OF

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NIL 169 FIELD 11B,18A

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

MEASUREMENT OF DENSITY BY GAMMA RAY TRANSMISSION

K. PREISS, A. B. CHILTON

/65- /

ILLINOIS, UNIVERSITY OF

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NJS 34 FIELD 9+,20D,20L, 7B

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DIFFUSION OF PHOSPHORUS AND BORON THROUGH SILICON OXIDE FILMS PREPARED BY VACUUM DEPOSITION AND REACTIVE SPUTTERING

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SURFACE POTENTIAL AND THE DEFORMATION OF SOLIDS

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PCS 411 FIELD 20D,20J, 7B

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22 SPACE TECHNOLOGY

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A COMPUTERIZED DATA BANK FOR MANIPULATION AND ANALYSIS OF INFORMATION RELATED TO SPACE TASK DESCRIPTIONS

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